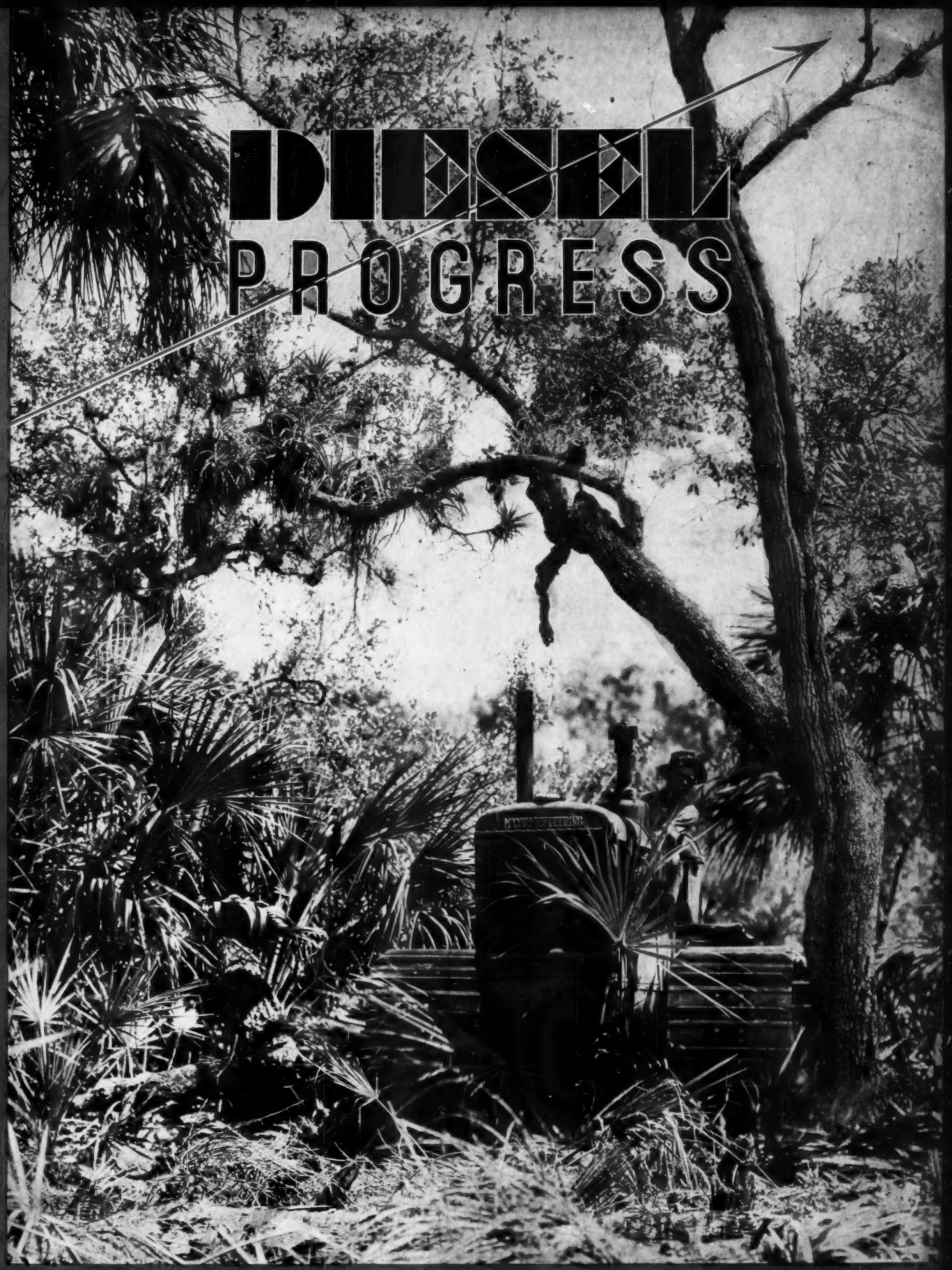
IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



DECEMBER, 1935 CIRCULATION OF THIS ISSUE—IN EXCESS OF 10,000 COPIES 25c

THE FOLLOWING MANUFACTURERS HAVE TESTED OR EXAMINED THE QUALITY OILS MANUFACTURED BY GULF FOR DIESEL ENGINE LUBRICATION AND HAVE PRONOUNCED THEM SATISFACTORY FOR THE LUBRICATION OF THEIR DIESEL ENGINES.

GULF

Allis-Chalmers Manufacturing Co.
ANDERSON ENGINE & FOUNDRY COMPANY
ATLAS IMPERIAL DIESEL ENGINE CO.
Benz Diesel
Bethlehem Steel Company (INCORPORATED)
BOLINDERS
BUSCH-SULZER BROS.-DIESEL ENGINE CO.
CATERPILLAR TRACTOR CO.
CHICAGO PNEUMATIC TOOL COMPANY
CLARK BROS. CO.
Colo-Diesel
CONTINENTAL GIN COMPANY
COOPER-BESSEMER CORPORATION
CUMMINS ENGINE COMPANY
DE LA VERGNE ENGINE COMPANY
ELECTRIC BOAT COMPANY
F. A. B. Manufacturing Co.
Fairbanks, Morse & Co.
Foos
FULTON IRON WORKS CO.
HERCULES MOTORS CORPORATION
HILL DIESEL ENGINE COMPANY
Ingersoll-Rand Company
Junkers Corp. of America
Kahlenberg
Kromhaut Diesel Engine Co.
McINTOSH & SEYMOUR CORPORATION
Mianus
Muncie Oil Engine Company
NATIONAL-SUPERIOR COMPANY
NORDBERG,
R. A. Lister & Co. Ltd.
STANDARD MOTOR CONSTRUCTION CO.
STERLING ENGINE COMPANY
STOVER MANUFACTURING & ENGINE CO.
SUN SHIPBUILDING & DRY DOCK CO.
Superior Gas Engine Co.
THE BUCKEYE MACHINE CO.
THE BUDA COMPANY
The Hooven, Owens, Rentschler Co.
THE MICRO CORPORATION
THE OTTO ENGINE WORKS
The Power Manufacturing Co.
The St. Mary's Oil Engine Co.
THE UNION DIESEL ENGINE COMPANY
Tips Engine Works
VENN-SEVERIN MACHINE CO.
Washington Iron Works
Weber Engine Company
WESTINGHOUSE
WINTON ENGINE CORPORATION
Wolverine Motor Works, Inc.
WORTHINGTON PUMP AND MACHINERY CORPORATION

GULF DIESEL ENGINE LUBRICATING OILS

GULF

GULF REFINING COMPANY

District Sales Offices

Boston New York Philadelphia Atlanta New Orleans Houston Pittsburgh Louisville Toledo

DIESEL PROGRESS for December, 1935. Volume I, No. 8. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at Brooklyn, New York, authorized May 14, 1935. Subscription rates: United States and Pan American countries $3.00, Canada and all other countries $5.00 per year. Single copy price 25 cents in U.S.A., 50 cents for all other countries.

Because of long years of experience we were again selected to furnish the crankshaft for the 8-cylinder, 850 h. p. marine Diesel engine installed by Winton Engine Corporation in the reconditioned U. S. Dredge "PULLEN".

CRANKSHAFTS

Complete facilities for the manufacture of crankshafts from the raw material to the completed product. Finished to the most exacting tolerances required by leading engine builders.

ERIE FORGE CO. · ERIE, PENNSYLVANIA

WE ALSO MAKE

Rough and finished propeller shafts, line shafts, thrust shafts, couplings, cast steel stern frames, propeller struts and propellers for all classes of vessels. Complete facilities for prompt delivery on all major forged or cast steel elements required in the building and powering of every type of ship.

Let's get down to Brass Tacks

about F.H.A. Modernization Credit

You have read in the newspapers about F. H. A. Modernization Credit. It is time now to do something about it.

You may now plan a comprehensive plant modernization and improvement program and spread the payments over a period of years.

Under the terms of the National Housing Act, as amended recently, up to $50,000 may be financed at a rate of 5% discount on 12 equal monthly instalments, with a maximum of 5 years to pay.

This constitutes the lowest rate and most attractive conditions ever made generally available for this type of financing.

Here is your opportunity to bring your plant and your equipment into line with that of any new plant; your opportunity to step up operating efficiency; to effect important savings —without impairing working capital. Your program may be one which will pay its own way from the start.

So let's get down to brass tacks. If you are interested in discussing modernization of your equipment on F. H. A. credit, act now while it is available. Write us fully — or send this memo now.

Here are a few things for which Modernization Credit may be had:

DIESEL ENGINES
for air compressors
cranes
drilling equipment
grinders
generator sets
hoists
injection pumps
oil field line pumps
refrigerators
water pumps

and many others

PS Bear in mind that all types of business concerns, as well as hospitals, schools, etc. are also eligible for F. H. A. Credit. Please pass this advertisement on to someone else who might also profitably use Modernization Credit to increase earnings or save maintenance costs.

Memo to
EQUIPMENT ACCEPTANCE CORPORATION
A Unit of COMMERCIAL INVESTMENT TRUST CORPORATION
1 Park Avenue, New York City
CAPITAL AND SURPLUS OVER $100,000,000

Without of course obligating myself in any way, I am interested in considering taking advantage of F. H. A. Modernization Credit to purchase the following equipment:

DESCRIPTION AND MAKE OF EQUIPMENT	ESTIMATED COST

FIRM NAME _____

ADDRESS _____

REPLY TO _____ D

On Guard!

at all times to insure efficient operation of your Diesel engine. This is what the WHEELCO LIMITROL with Automatic Switch will do for you. It indicates and protects the temperatures of

EXHAUST WATER and OIL

A performance heretofore thought impossible of accomplishment with one instrument.

Every Diesel Engine manufacturer and every Diesel Engine user will be very much interested in this, and should get the complete information on this new development of control.

Because, heretofore, you have either not had the instruments to check the performance required, or you have had to use too many instruments to be economical or practical.

The WHEELCO System of Automatic Control is a NO CONTACT CONTROL SYSTEM.

One Instrument Will Indicate and Control The Set Limit Temperature of

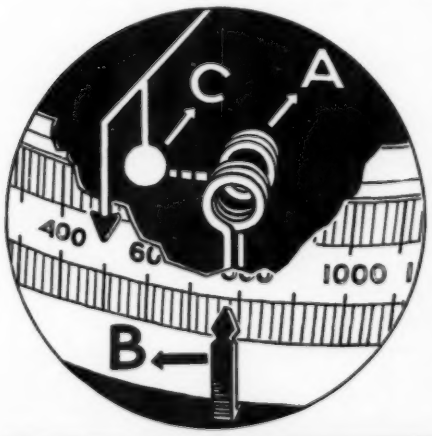
Exhaust **It will automatically check every 10 seconds each exhaust thermocouple up to 39, and in case of excess temperature will automatically sound an alarm and shut down engine if desired.**

Water **Then manually or automatically a new limit cycle can be established and controlled, which will check your water temperature one minute, and your exhaust temperature another minute.**

Lubricating Oil **Temperature of the oil can also be read and controlled manually or automatically by setting the pointer in the cycle covered by the oil thermocouples.**

Indicating Pyrometers as low as $5.00 per cylinder

SEND FOR YOUR COPY — NOW!



The Heart of the Wheelco System A Radio Principle

Referring to sketch: Between the coils "A" (which are attached to and move with temperature limit set pointer "B") a current flows on a given wave length. The heat indicator carries the metal flag "C" which, when it enters into the coil "A", changes the wave length on the same principle as turning the dials of a radio set. As a result a new wave length is set up, causing the rise in current of a vacuum tube, which in turn starts an electrical relay to function.

DEPT. D-1

THERMO-CONTROL DEVICES, Inc.
1114 Milwaukee Avenue
Chicago, Ill.

Please send me data book and literature on instruments checked:

- ☐ **Indicating Pyrometers**
- ☐ **Limitrol shown above**

Name_____

Address_____

Company_____

THERMO CONTROL DEVICES, Inc.
1116 MILWAUKEE AVENUE CHICAGO, ILLINOIS

Bringing DIESEL ECONOMY and DEPENDABILITY to the Oil Fields!

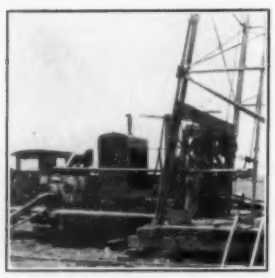
YOU want power that can be relied on—power that runs when you want it and stays running, power that is easy to start under all conditions—economical power.

While your problem may be somewhat different, the many Buda Engines in the oil fields, both at home and abroad, are the best guarantee of the kind of power you want. Many of them have been in service eight years in the hands of some of the leading oil companies.

Buda Diesel Engines are compact. They bring greater safety. Their light weight means the minimum expense in foundation changes. Their fuel consumption is low. They are easily portable and they have been proved economical and dependable in almost every engine service.

Why not tell us your power problem. Specify the approximate horsepower required. There is no obligation.

Mine Locomotive



Hoist

BUDA DIESELS Are Standard On These Products

Locomotives	Boats
Generator Sets	Trucks
Feed Grinders	Hoists
Refrigerators	Sweepers
Injection Pumps	Busses
Cranes	Rollers
Compressors	Pavers
Dredges	Crushers
Logging Equipment	Shovels

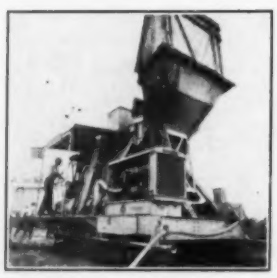
Water Well Drilling Equipment

Oil Field Pipe Line Pumps

THE BUDA COMPANY
Industrial Division K
Harvey [CHICAGO SUBURB] Illinois

BUDA ENGINES

Paver

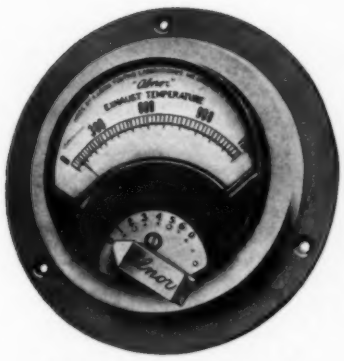


Road Roller

Pipe Line Pumping

Shovel

Lighting Plant

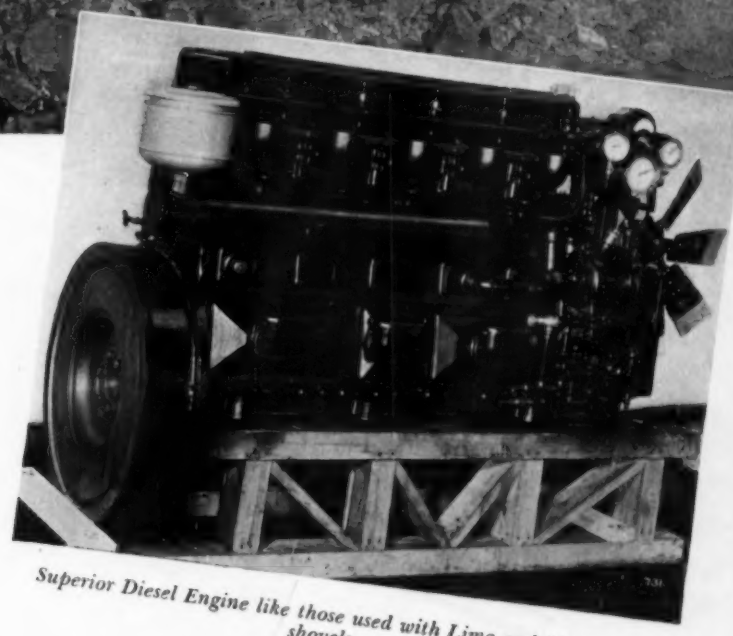


Model ARF used with Superior Engines for shovel service.

View shows Lima shovel with two-yard dipper digging frozen shale on the Fort Peck Dam project in Northern Montana. Four Limas are being used on this ten million yard job, all owned by Spillway Builders, Inc.

ALNOR

A Rugged Pyrometer for a Tough Service



Superior Diesel Engine like those used with Lima and Marion shovels.

FOR such severe service as this, an ordinary exhaust pyrometer wouldn't have a chance.

Engine vibration alone is generally too much for most pyrometers, to say nothing of the jars, jolts and shocks incident to shovel operation.

This specially built RUGGED "Alnor" Pyrometer used with Superior Diesels on Lima and Marion Shovels stands shovel service as easily as the usual pyrometer stands switchboard mounting in the stationary plant.

"Alnor" pyrometers are made in two popular and widely used styles for mobile service: (1) convenient hand portable for use when desired or where space does not permit the permanent installation; (2) permanently mounted and wired units offered to suit the various classes of Diesel service such as on excavators, dredges, shovels, locomotives, rail cars and in bus and truck or tractor service stations. Other types available for both stationary and marine service.

It will pay you to investigate the value of using "Alnor" pyrometers with every Diesel.

Write for Catalog.

ILLINOIS TESTING LABORATORIES, Inc.
423 North LaSalle Street • Chicago, Illinois

Testing Engineers and Manufacturers of "Alnor" and "Price" Pyrometers
The Products of 35 Years' Experience

"Alnor" Pyrometers—*The Engine X-Ray*

HARRISON

HEAT EXCHANGERS
contribute to
WINTON PERFORMANCE

Harrison Heat Exchangers provide uniform oil temperature control on Winton and other makes of Diesel engines—maintaining engine oil at the temperature required for *best* lubrication—thus increasing engine performance, and lessening the wear on bearings and cylinders. The Harrison Heat Exchanger will improve the operation and contribute to the economy of any Diesel engine on which it is installed. Harrison's engineering and manufacturing departments, backed by years of experience in the heat transfer field, are available to you.

HARRISON RADIATOR CORPORATION
LOCKPORT, NEW YORK

Not "Just Fuel Oil"

"DSJ-7"

Is A Special Diesel Fuel Oil

DSJ-7 is an extremely satisfactory Diesel fuel—efficient and economical. Developed ten years ago for a nationally known Diesel engine manufacturer, this Special Diesel Fuel is viscosity-controlled, carbon-free, and powerful. Where ordinary fuel oils fail, DSJ-7 succeeds.

> One consumer writes: "We use DSJ-7 in two 360 H.P. Diesels, direct-connected to 250 K.V.A. generators. From meters located on our fuel line, switchboard, and plant discharge line, we determine exactly the number of K.W. produced per gallon of fuel, as well as gallons of water pumped per gallon of fuel consumed . . . . Nine years' experience with your Special Diesel Fuel indicates that DSJ-7 is ideally suited for our engines, and is cheaper than lower priced fuel oils."

DSJ-7 Diesel Fuel Oil is now available to Ohio, Indiana, and Michigan users.

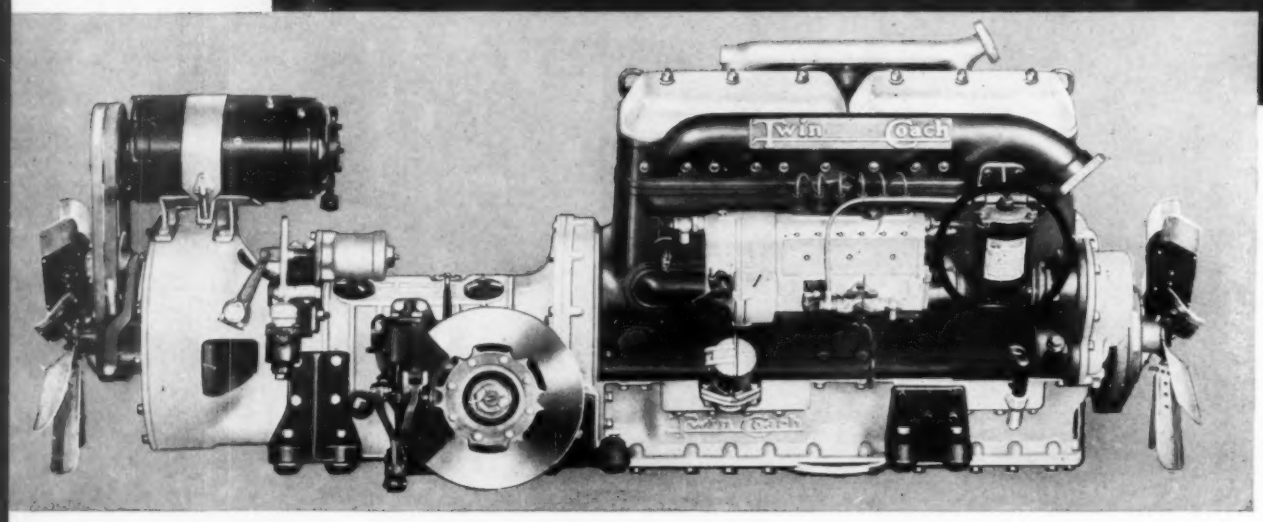
• • • A DIESEL FUEL OIL FOR YOUR PARTICULAR ENGINE • • •

ALLIED OIL COMPANY

INCORPORATED

Fuel Oil Specialists

CLEVELAND, OHIO



This Hercules Motor (Purolator protected) is a typical example of "up to the minute" Diesel engineering design.

THESE BUSSES WILL ARRIVE ON SCHEDULE

The new Twin Coach jobs are the last words in both comfort and power. The Hercules Motors Corp. is furnishing the Diesel Engines that insure 1936 service. Their very name insures reliability . . . and their use of Purolator Filter protection is a further instance of the care they exercise in the matter of economical operation. Motor Improvements, Inc., 365 Frelinghuysen Avenue, Newark, New Jersey, makers of

PUROLATOR

The Oil Filter

At Last! It's Here

a Machine that Actually Does the Trick

FABRIFORM ELECTREFINER

SUCCESSFULLY RE-REFINES

USED DIESEL LUBRICATING OILS

GENERAL CRANK CASE DRAININGS
RED ENGINE OILS
TURBINE OILS

Increase Operating Efficiency

Decrease Operating Costs

Fabriform Electrefiners are now producing high grade lubricating oil from crankcase drainings at a cost of less than 6 cents per gallon.

IT Actually Re-refines — Fabriform Electrefiner does not just filter or reclaim used lubricants; it actually and literally re-refines, producing an oil as good or better than original specifications.

IT Restores Color.

IT has a filter that does not gum up or require time of an operator to clean, and when operated according to instructions it is not affected by the pepper sludge peculiar to diesel drainage.

IT Has No Moving Parts — No motors, fans, belts, or paddles in or on the machine; no moving parts to wear out or adjust.

IT is 90% Automatic — Requiring just a few minutes of an operator's time on each batch of 15 gallons of drainage.

IT Automatically Steam Treats the oil at temperatures of 480° to 550°F. It is electrically operated and thermostatically controlled.

IT is All Electrically Arc Welded and built under A.S.M.E. Code. Manufactured by Welded Products Co. of Bell, Calif.

IT is Not Expensive to Buy — Install — or Operate. It can be purchased on 2-year payment plan under National Housing Act terms.

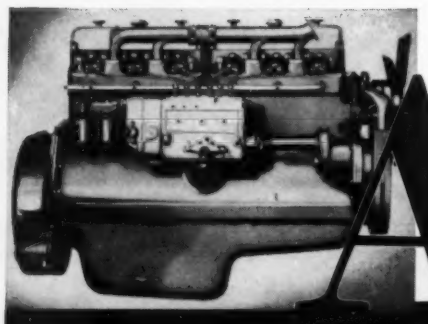
The ultimate of Diesel Economy has not been accomplished until Fabriform Electrefiner has been installed in your plant. Fabriform Fuel Fired units have been in successful operation in all parts of the country since 1930.

Write for further details now! We also invite inquiries from responsible sales organizations relative to territories now open.

Distributed Exclusively by

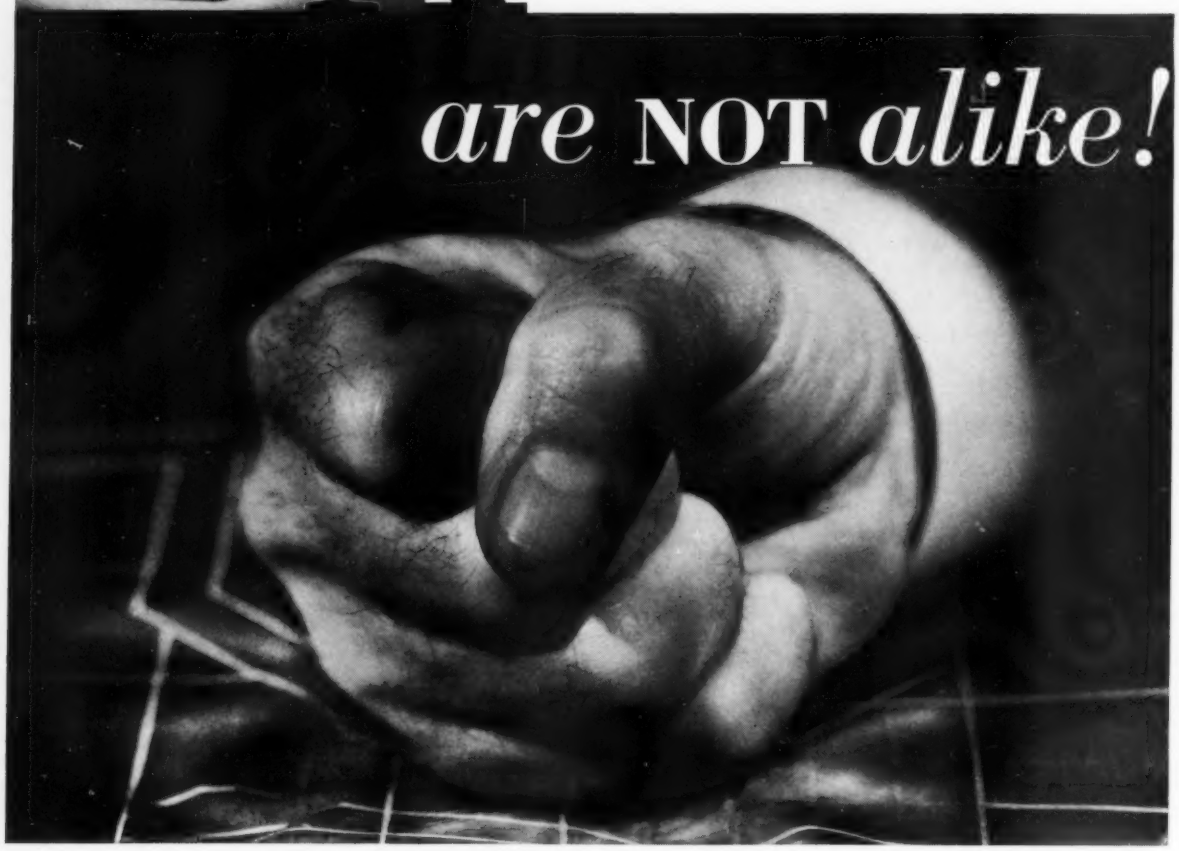
FORBES-ENGLISH SALES COMPANY

1421 SO. HILL STREET, LOS ANGELES, CALIFORNIA



ALL DIESELS

are NOT *alike!*



The chief difference between the Waukesha Comet Diesel and ordinary Diesels is in the combustion chamber.

The Comet type chamber . . . designed and patented by Ricardo . . . is a separate insert, surrounded by a heat insulating space, which gives the chamber a high heat holding capacity. It is spherical in shape for compactness of form, while the shape and tangential location of the entrance secure maximum air movement or turbulence within the chamber itself. This high air velocity prevents delayed ignition and, as a result, the Comet Diesel runs with a clear exhaust and great smoothness. These features, combined with easy starting, make the Comet the accepted type for vehicle work everywhere. ***Write for Bulletin 1001. Waukesha Motor Company, Waukesha, Wisconsin***

WAUKESHA ENGINES

DIESEL PROGRESS

Editor and Publisher
REX W. WADMAN

Art Director
HEYWORTH CAMPBELL

CONTENTS FOR DECEMBER

PAGE

PENNICHUCK WATER WORKS 14

THE CANNON BALL 17

LONDON LETTER 18

DIESELS TO THE NORTH 20

AIRCRAFT DIESELS 24

A NEW DRAGLINE DIESEL 26

B. TURECAMO PLANT 28

KAISER AGGREGATE PLANT 30

DIESELS CLEAR FLORIDA JUNGLE 32

MOTORLINER *PILSUDSKI* 33

DIESELS CONQUER THE ANDES 34

WIEDA'S, INC. 38

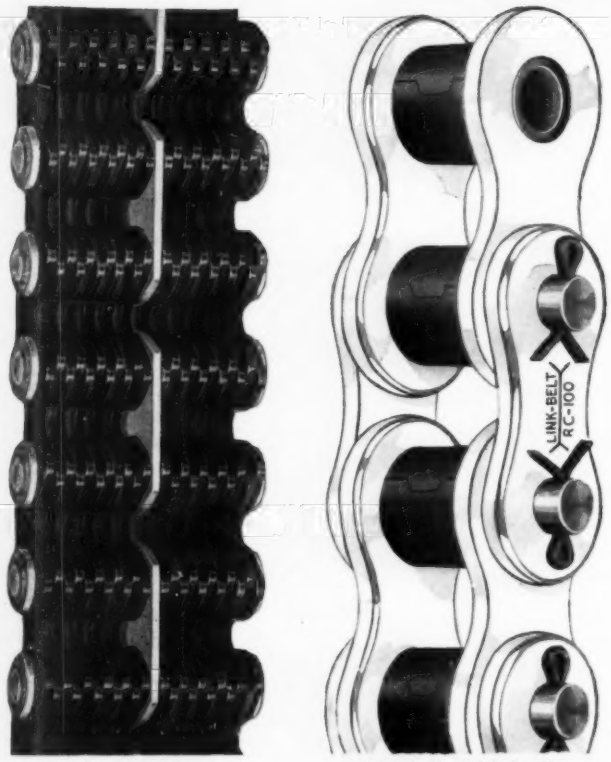
DIESEL PROGRESS for December, 1935, Vol. 1, No. 8. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel. MUrray Hill 2-5092.

Subscription rates: U.S.A. and Pan American Countries $3.00 per year; 25c per copy. Canada and all other countries, $5.00 per year; 50c per copy. Back copies $1.00.

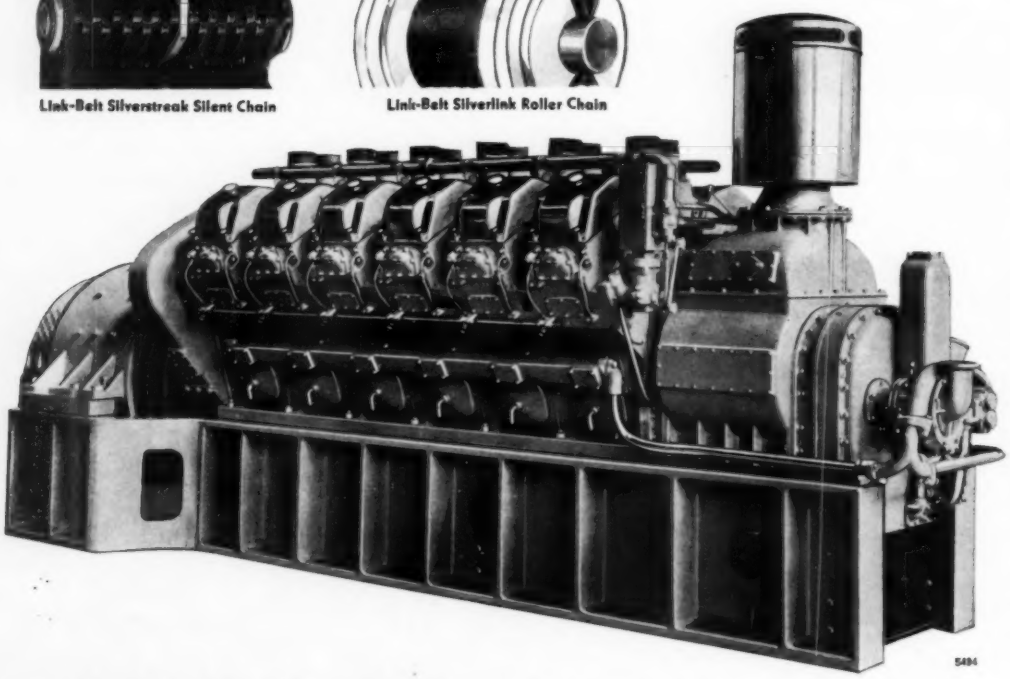
LINK-BELT

POSITIVE CHAIN DRIVES

FOR DIESELS



Link-Belt Silverstreak Silent Chain — Link-Belt Silverlink Roller Chain



5484

THE WINTON

ALL Winton Diesel engines of the type illustrated are standardly equipped with Link-Belt Silverlink Roller Chain for the important service of driving Camshafts and Pumps.

Link-Belt automotive chains of the silent and roller types represent the last word in fine chain making. Their distinctive appearance and dependable performance are second to none. Their use assures correct timing, quietness and long life.

LINK-BELT
Positive Drives include:

Silverstreak Silent Chain Drives
Silverlink Roller Chain Drives
P. I. V. Gear—Variable Speed Transmission
V. R. D.—Fractional H. P. Variable Speed Transmissions
Herringbone Gear Speed Reducers
Worm Gear Speed Reducers
Motorized Helical Gear Speed Reducers
"RC" (Roller Chain) Flexible Couplings
Send for Catalogs.

●

900 H. P., 2-cycle 12-cylinder, V-type Winton Diesel engine which is equipped with Link-Belt Silverlink Roller Chain.

LINK-BELT COMPANY, INDIANAPOLIS - DETROIT - *Offices in Principal Cities*

DIESEL PROGRESS

REX W. WADMAN, Editor and Publisher

WHILST this December issue is but our eighth, we have come to the end of our first calendar year, so to speak, and I am feeling a trifle retrospective. The quotation from Rudyard Kipling's brilliant "Mary Gloster," which appeared on the editorial page of our first issue last May, is again repeated for cause. The tendency of the contemporary Diesel press to rather flagrantly imitate our distinctive styling and format drives me to gently suggest that imitation is but the sincerest form of flattery.

Whatever success DIESEL PROGRESS has achieved in its short but spectacular career is due to just one thing – our editorial alertness, our editorial resourcefulness. We have gathered together for you, our readers, each month an excitingly interesting array of useful and informative information on the application of the Diesel Engine to varying power problems. We have displayed this material in a modern, attractive manner to make it easy for YOU to enjoy and benefit from this magazine.

That we have succeeded in holding the interest of our ten thousand readers is attested by the heavy correspondence which has poured across my desk since the first issue. It has been my pleasure to answer hundreds of letters each month from our readers in which you have asked intelligent questions pertaining to the application of Diesel Engines to your particular power problems. I hope my letters have been helpful. Some of the questions have called for a considerable amount of research and there has been a delay in answering in some instances – for which I beg indulgence. Our organization is comparatively small as yet and we do try to make our replies accurate and really useful.

And so we come to the end of our first calendar year and I want to thank you sincerely from the bottom of my heart for the encouragement extended by our readers and the splendid financial support extended to us in such great measure by our advertisers – we are going into the new year full of optimism, full of enthusiasm, thanks to you and your support.

Rex W. Wadman

A GENTLE REMINDER

I didn't begin with askings. I took my job and I stuck; I took the chances they wouldn't, an' now they're calling it luck.

• • • • and they asked me how I did it, and I gave 'em the Scripture text, "you keep your light so shining a little in front o' the next!"

They copied all they could follow, but they couldn't copy my mind,
And I left 'em sweating and stealing a year and a half behind.

—RUDYARD KIPLING,
The "Mary Gloster'

PENNICHUCK WATER WORKS

FEW cities of comparable size can take any greater pride in their water works than Nashua, N. H. The Pennichuck Water Works, a private company, supplying the city of Nashua with its daily requirements, is an outstanding example of dependable water systems.

A Diesel pumping unit installed last March provides absolute protection against any emergency that might ever threaten the city's water supply at its source. Though a standby unit which has seen but comparatively little actual use since installation, the Diesel's worth is far in excess of its cost, for in reality it is insurance in a most tangible form against the possibility of water power shortage in droughts or periods of sparse rainfall.

The unit is a five cylinder, 10¾" x 14½", direct injection Worthington Diesel engine rated at 250 hp. at 400 rpm. Power is transmitted through a Farrel-Birmingham speed increasing gear direct connected on one end to a 10 kw. dc. generator through a multi-V belt drive and on the other to a Worthington centrifugal pump with a capacity of 4,200 gallons per minute, at 1,350 rpm. Water flows through a Rotovalve automatic check valve, which guards against surge when the pump is shut off, and thence direct to the distributive system.

The original pumping station was built in 1854. It was a wooden structure and housed a water-driven pump. In 1865, a very dry year, the quantity of water in Pennichuck Brook proved insufficient to provide both power for pumping and a supply for the city, so that a steam engine was installed, as an auxiliary unit, to use when the water in the stream was low.

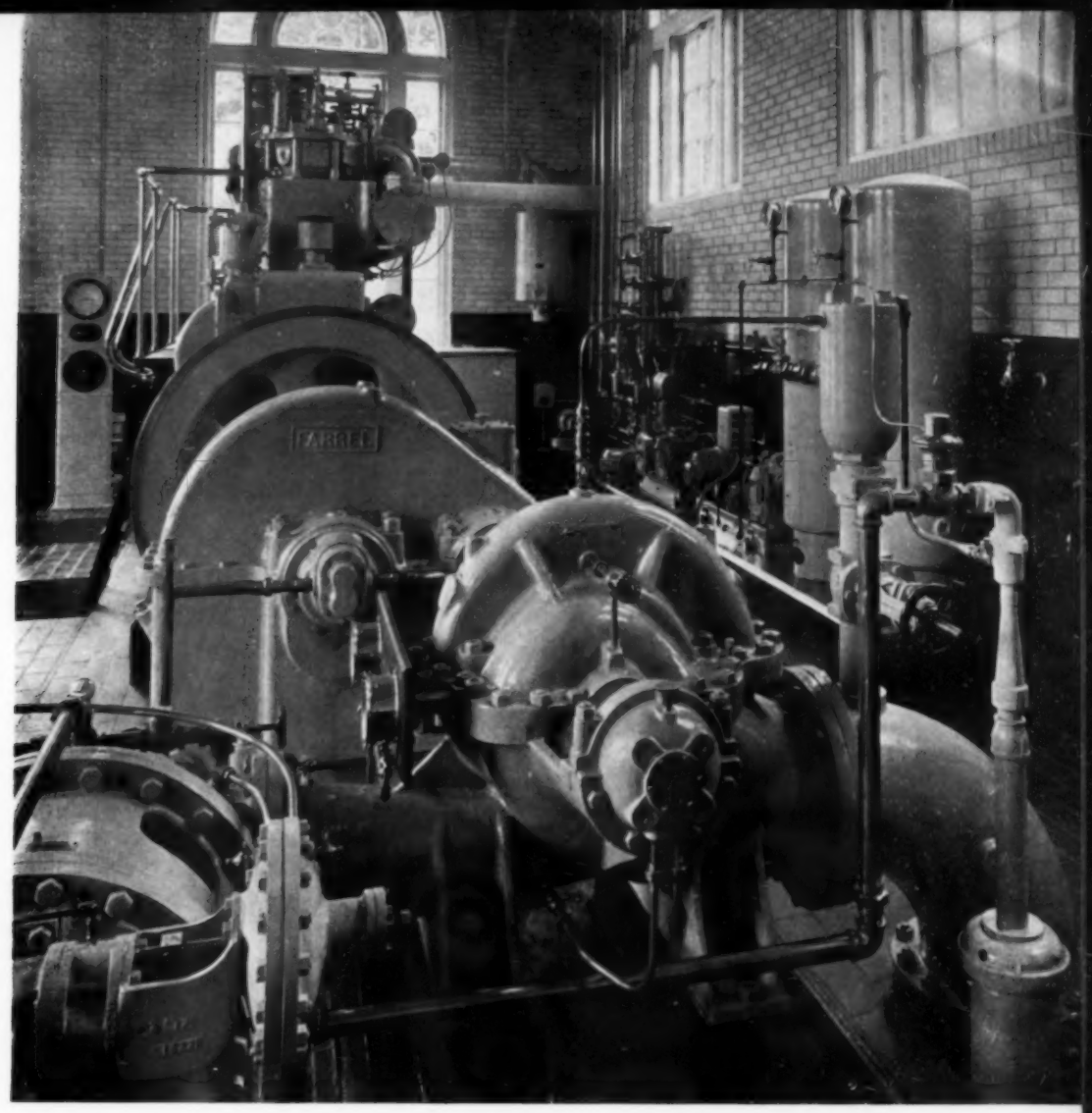
Later, in 1893 the first steam unit was replaced with a Snow horizontal duplex triple expansion pump with a daily capacity of 8,000,000 gallons. Up to the time the Diesel unit was installed last March, this steam unit was the sole standby. Used only intermittently, whenever water in the brook ran low, it is still in working condition. The one serious drawback of the steam plant, and which was responsible for the purchase of the Diesel pumping unit, was that in event of major breakdown, it would take weeks to have new parts built. Meanwhile the city would be dependent entirely on the hydro plant.

The present hydro plant, installed in 1900, a Dean & Main pumping station, with a daily capacity of 6,000,000 gallons, pumps from 80% to 90% of all the water used and is operated at all times when there is sufficient water in the brook to drive the 300 hp. water turbines. This turbine derives it power from the surface water of Pennichuck Brook impounded behind a series of dams and carried through a penstock approximately 1,500 feet long to the turbine. The effective head on the turbine or water wheel is about 60 feet.

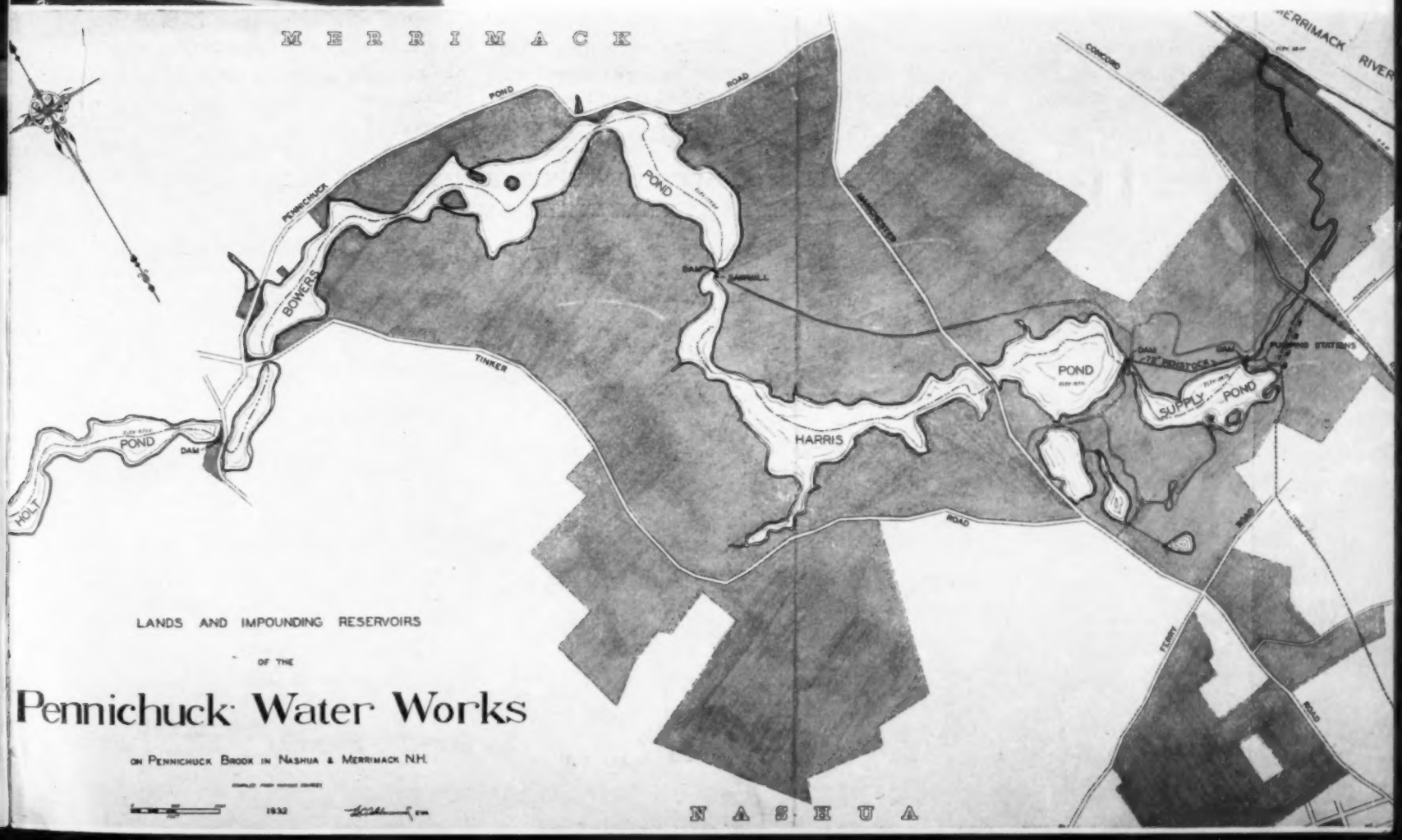
The domestic and commercial water supply is obtained from flowing wells and from springs. This water is collected in a storage basin of 56,000,000 gallons capacity from which it is pumped either to the distributing reservoir or to the mains. The approximate daily yield from these wells and springs is 5,000,000 gallons, while the average daily consumption is about 2,750,000, the surplus being wasted over the spillway. The average daily pumpage is 2,750,000 gallons, though on some days in summer the demand is as high as 4,000,000 gallons or over.

There are four dams in the flow of Pennichuck Brook, impounding about 650,000,000 gallons

The auxiliary pumping station of the Pennichuck Water Works built in 1893. The right wing contains the 43-year old steam pumping unit, and the opposite wing which was formerly a coal pocket before the plant was modernized, now houses the Diesel unit.



The compact new Diesel-driven pumping unit illustrated above, has a capacity of 6,000,000 gallons a day and costs only a third as much to operate as the huge steam plant formerly used as a standby unit. Below — Map showing the 2,000 acres of land comprising the Pennichuck Water Works holdings.



LANDS AND IMPOUNDING RESERVOIRS

OF THE

Pennichuck Water Works

ON PENNICHUCK BROOK IN NASHUA & MERRIMACK N.H.

1932

of water. This water, while of excellent quality and available for domestic consumption if needed, is used by the Company for power purposes only.

The surface water from the valley – to prevent its mingling with that from the wells – is diverted around the storage basin through a 72-inch penstock. This penstock provides a waste-way for the excess from the valley, and the water passing through it is utilized, as needed, to furnish power for the Dean & Main water power pump.

An additional reason for purchasing the Diesel unit is contained in the following statement by D. C. Calderwood, engineer in charge of the Pennichuck Water Works: "For the past few years, we have maintained all of our storage reservoirs (Harris Pond, Bowers Pond, and Holt's Pond) full throughout the year because, if while operating the steam pump a major break-down should occur, we would have to depend upon the water power until repairs were completed. In holding back this tremendous reserve amount of water, we could not utilize our water power to the fullest extent, so, with this in mind, and because we wished to have a third complete unit, we decided after considerable study that under our conditions a Diesel unit would be the most economical and efficient prime mover."

The last comment in Mr. Calderwood's statement, namely that the Diesel would be the most economical and efficient prime mover, was amply borne out in the acceptance tests on March 26 of this year conducted by the engine company officials, the consulting engineers, and the water works owners. In a series of tests under varying conditions the fuel consumption met fully the guarantees of the engine manufacturers. These figures are tabulated below.

The Diesel pumping unit was erected in the space formerly occupied by the coal pocket in the left wing of the steam plant illustrated on the preceding page. It has several interesting features. Starting air is furnished by two, two-stage 3⅛" x 1⅞" x 2" air-cooled Worthington compressors. The first compressor is electric driven by a 2 hp. motor fed from the 10 kw., dc. generator, multi-V belt connected to the high speed shaft of the Farrel-Birmingham increasing gear. The second compressor, a duplicate of the first, is operated by a Novo 3 hp. gas engine and is used only as a standby. If pressure in the air tanks falls below 200 pounds, the first compressor starts automatically and builds up the pressure to 250 pounds.

Along the wall, opposite the engine, is a 60-cell compartment of Exide storage batteries of 80-ampere, 125 volts capacity used for lighting, arranged in tiers, which are charged by the 10 kw., Ideal dc. generator when the engine is running and charged when the Diesel is not operating by a G-E 125-volt dc. generator motivated by a shaft belt driven from the water wheel in the main hydro plant 600 feet away. Thus, the batteries are kept at full charge continuously whether the Diesel engine is operating or not.

Two 7,500-gallon fuel oil storage tanks are located outside just in the rear of the Diesel wing of the steam plant. Fuel is pumped into the day tanks inside the engine room by an electrically operated Worthington rotary transfer pump. A Goulds hand-operated gear pump serves as a standby for emergency use. In cold weather hot water from the engine can be circulated through the outside storage tanks by means of coils inside them, by a Worthington Monoblock hot water circulating pump. A Goulds Hydroil centrifuge, so connected that it can be operated whether the engine is running or not, insures a supply of clean oil. The engine is protected with an Alnor exhaust pyrometer whose readings are taken from a Weston instrument board along with other indicators for lubricating oil temperatures, cooling water gauge and the engine tachometer and ammeter. Other equipment includes a Maxim exhaust silencer and a Vortox air intake filter.

The instrument board in the Diesel plant and the instrument board in the hydro plant are interconnected, so the engineer in charge and his two assistants may observe operating conditions wherever they happen to be.

Nashua's 32,000 population are well acquainted with the value of the Pennichuck Water Works to them, as Engineer Don Calderwood has been frequently called upon by local civic organizations and clubs to give talks on the city's water supply system. For one thing it is not dependent in any way on power purchased outside. The Diesel unit is a main source of interest, not for what it has done in the total of forty days' service seen, but for what it can do, if and when, the occasion demands it.

Of the three separate and independent prime movers it is the most compact, the most modern, and the most dependable in an emergency. It is, as one might say, the Watch Dog of Nashua's water supply.

TABULATION OF RESULTS OF ACCEPTANCE TESTS MARCH 26, 1935
DIESEL ENGINE-DRIVEN CENTRIFUGAL PUMPING UNIT

	Time	*Duration hours*	*Speed, r.p.m. Engine pump*	*Rate g.p.m.*	*Head feet*	*Fuel consumption lbs. per hr. By test*	*Guaranteed by mfr.*
Test	10:15-3:15	5	366-1304	4402	146.4	81.4	82.0
Adjusted for speed			379-1350	4560	157.0	—	—
Guarantee			379-1350	4200	160.0	—	—
Test	3:45-5:15	1½	366-1304	3470	169.8	75.6	76.8
Adjusted for speed			379-1350	3590	182.0		
Guarantee			379-1350	3150	182.0		
Test	5:45-7:00	1¼	387-1377	2920	201.0	78.2	78.3
Adjusted for speed			394-1403	2975	208.6		
Guarantee			394-1403	3000	200.0		
Adjusted for speed			388-1384	2935	203.0		
Guarantee			388-1384	2500	200.0		
Test	7:15-8:45	1½	377-1345	4575	159.8	92.2	92.5
Adjusted for speed			379-1350	4590	161.0		
Guarantee			379-1350	4200	160.0		

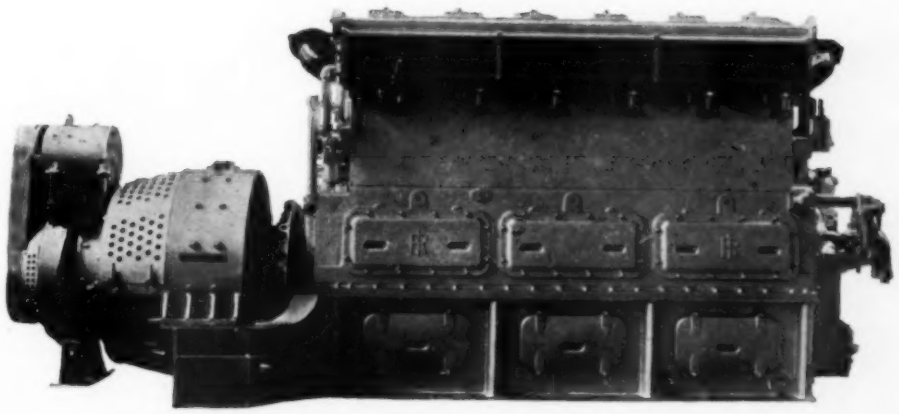
THE CANNON BALL

By L. G. COLEMAN

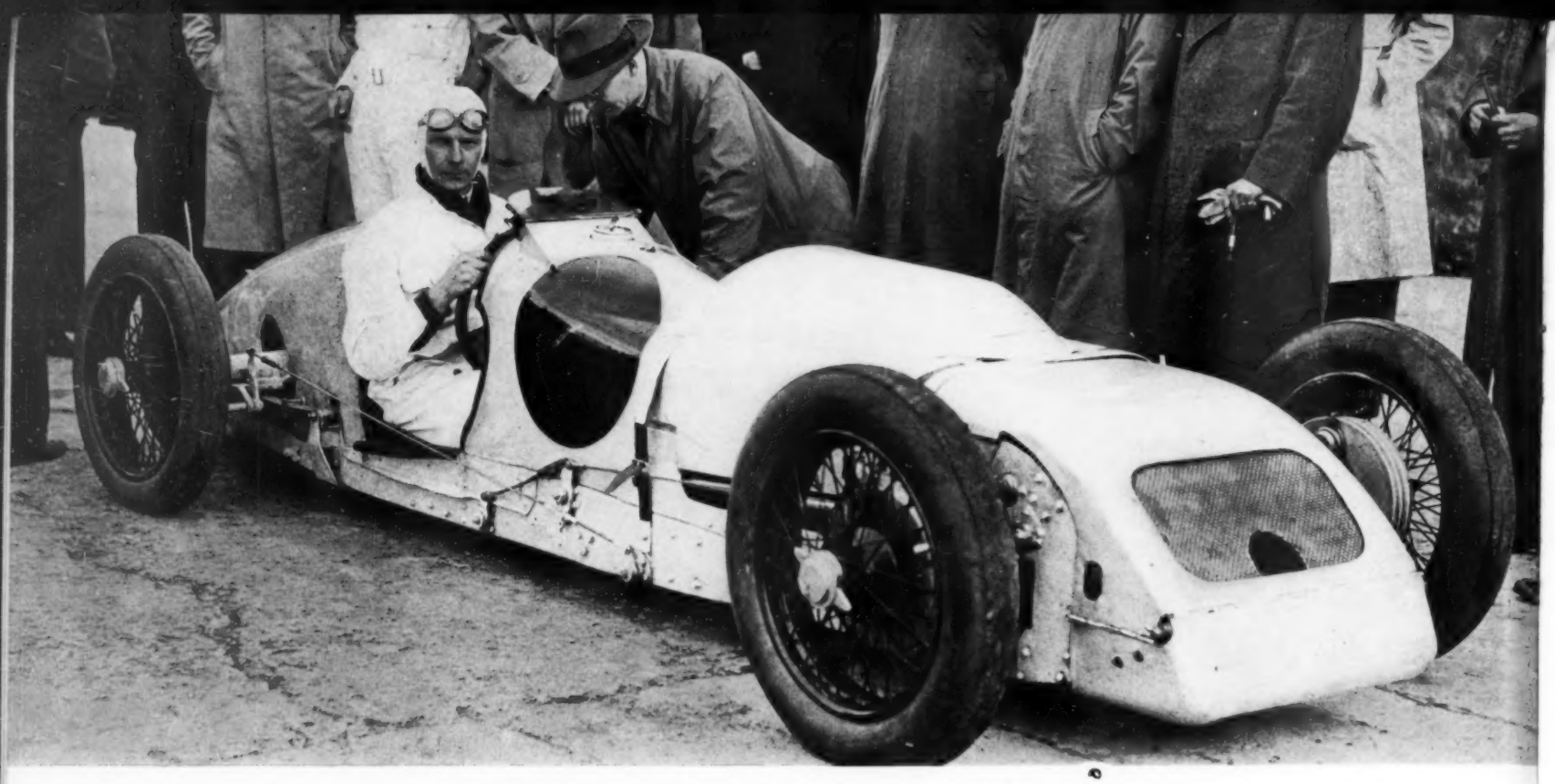
ANOTHER, and another, and another! Railroads that buy Diesel Electrics keep adding them and keep dropping the cost per passenger mile of operation. A third Diesel-electric unit has now been placed in service by the Boston & Maine Railroad.

The 78-foot rail car illustrated here and built by the St. Louis Car Company is a combination locomotive, mail and baggage car, of a pleasing semi-streamline construction, designed to haul standard railroad passenger equipment.

Rail Car No. 1140, which started in regular revenue service the last week in August, hauls the *Cannon Ball*, a train of four coaches, between Boston and Concord, N. H., over a river grade, a distance of 73 miles, at a scheduled speed of 45 mph., making three stops en route. The rail car then continues on from Concord to White River Junction, hauling two coaches over a distance of 70 miles, over ruling grades of 1.5 per cent, at a schedule speed of . . . . *And now please turn to page 41*



One of the twin vertical six-cylinder 400 hp. Ingersoll Rand Diesel generator units that furnish power to the Boston & Maine Railroad's new "Cannon Ball," illustrated above, which runs daily between Boston and White River Junction, Vermont.



The 2.8-litre four-cylinder Diesel engined racing car in which Reg. Munday, well known British racing driver, recently established six world's records.

LONDON LETTER

By GEORGE LIND

With London Letter Number One a new DIESEL PROGRESS feature has been inaugurated. Every month in these columns a running commentary will appear on some aspect of European Diesel engine development. This month the subject is Transportation, with particular reference to recent British and Continental efforts in the field of small, ultra-high-speed engines.

A SHORT while ago the doors closed for the last time on the 29th Annual London Motor Show, the most successful and comprehensive of any yet staged. This year there were 53 stands, displaying 60 different makes of automobiles and including, amongst others, a record total of 13 American exhibitors. One thing, though, was still missing from that shining array, namely the mass produced Diesel-engined family car.

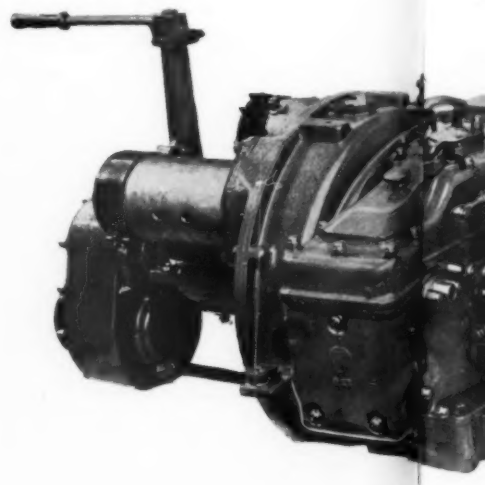
Just how near British engineers have brought the oil-engined runabout was nevertheless demonstrated a few weeks ago by the Gardner Company of Manchester. This concern, one of the oldest and most popular manufacturers of small Diesel motors in England, has been building bus and lorry engines of the direct injection type for a number of years now. Until recently, however, their units belonged to the heavier, medium high-speed class.

Now, to the surprise of the Diesel world, Gardners have suddenly launched on the market a 4 cylinder, 3.8 litre machine capable of over 3,000 rpm., with a power output of 83 bhp. Though primarily intended for use as a commercial vehicle unit, the new engine has been designed with an eye to its adoption in private car chassis as well. The first engine produced was, in fact, installed beneath the bonnet of a medium power sports 4-seater.

The car, originally a 1932 Lagonda fitted with a petrol engine of about the same size, reached a maximum speed of 83 mph. on top gear during the test run and gave an acceleration figure of 24 2/5 seconds from a standing start to 60 mph., using first, second and third gears. Perhaps the most astounding result of all was the fuel consumption. Over a difficult and hilly 182-mile drive the average worked out at 42 mpg.!

As a thoroughbred sports car the Gardner-Lagonda is a complete success and in no way falls short of its petrol-engined counterpart. Instant starting is effected with a 70 amp., 12-volt starter-motor; no undue mechanical noise is audible, the exhaust note is not unpleasant nor loud and the machine answers the controls in a positive and effective way.

The Victor Cub. This midget two-cylinder Diesel develops 20 bhp. at 3,000 rpm. and is applicable to light-weight chassis.



Although Gardners deserve full praise for their latest work with small oil engines, other British firms have not been standing still either. Of particular interest also are the results of the record attempts made with a 2.8-litre 4-cylinder Diesel-engined racing car owned by Mr. Reg. Munday, a well known British racing driver. Mr. Munday's car, basically one of Parry Thomas's flatiron specials, now holds the world's 3-litre Diesel-engined car records over 50 km., 50 miles, 100 km., 100 miles, 1 hour and the flying kilometre, all at speeds of over 88 mph. These records, which were made on the concrete saucer of Brooklands track, represent maximum all-out speeds of about 115 to 120 mph.

The car weighs 2,250 lbs. complete and the Perkins Wolf engine was tuned for the record attempt to give 65 bhp. at 4,000 rpm. For the flying kilometre record of 94.7 mph. a Zoller supercharger was connected to the intake, blowing at 6 lbs. per sq. in. pressure. With the blower the power output increased to nearly 85 bhp.

Some days after the record run the same car took part in the last open meeting of the season at Brooklands and, although not actually winning a race, it put up a good performance and motored faultlessly throughout. Perkins, the makers of this engine, are one of the most successful manufacturers of really small power units in England and they attribute their success to the patented "airoflow" combustion system which they use. This system is a compromise between direct and pre-combustion chamber injection, the injector spraying the fuel into the main combustion space as well as into an hemispherical pre-combustion chamber.

At about the same time that the Perkins-Thomas Special was running round after records another pioneer run was being made at Coventry, the centre of the British automobile industry. Here, one rainy October morning, a tiny engine in a 10 cwt. van was making history by being the smallest oiler yet produced to operate successfully on the road. This midget motor of 1,000 cc. capacity, which develops 20 bhp. at 3,000 rpm., is a 2-cylinder, horizontally opposed, four stroke, built by the Victor Oil Engine Company. The design is not new, having been incorporated in stationary and marine sets since 1932, but the application to a light weight chassis is something quite novel.

We have, in this country, a very popular 2-cylinder 7 hp. petrol engined light car known as the Jowett and it is this chassis which has been used for the Victor oil engine. Under normal working conditions the fuel consumption of the Victor-Jowett works out at 65 mpg. or 2 1/3 cents for every 8 miles of road covered. The top gear performance is exceptional and with a 5.25 to 1 gear ratio 50 mph. can be exceeded. The construction of the engine is on sound, sturdy lines, with a built-up crankshaft and roller big-end and main bearings. Air cell combustion is used and the lubrication system employs water cooling for the gear-type pump as well as for the main oil supply. The whole engine is totally enclosed and looks a very neat and workmanlike job.

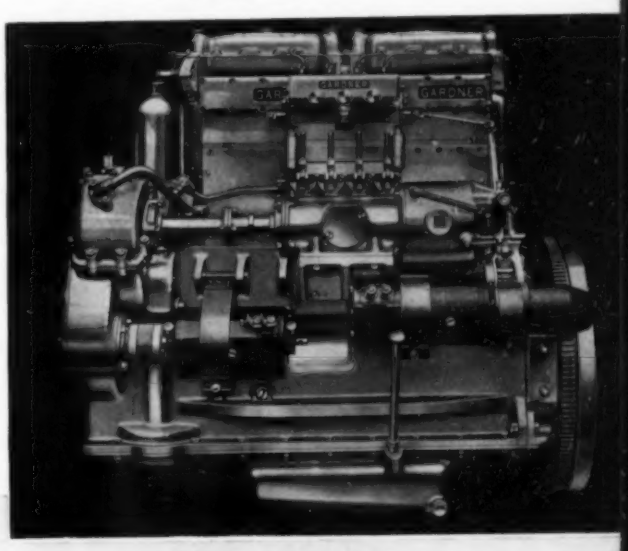
Considering, for a change, some of the Continental makes and their engines, one can say quite definitely that they are only finding use for the heavier, slower type of transport unit. Weight to power ratios are well below the British standards and power outputs per litre of capacity are in general lower than in England. There are, of course, exceptions, as, for instance, the opposed piston engines of Junkers manufacture and the large V-type rail-car units built by the Maybach and Mercedes companies.

As a result of the lack of demand for light, speedy Diesel motors the existing designs are straightforward and somewhat uninteresting. One of the few exceptions to the rule is the German Krupp 3.45-litre, 4-cylinder, horizontally opposed, air-cooled engine, as used for the Krupp 2½-ton lorries and 24-seater coaches. The power output is 50 hp. at 2,300 rpm., so that it can be accounted a really high-speed engine. Normally the 4-stroke cycle is employed, but quite recently a 2-stroke edition of the same general design has been marketed.

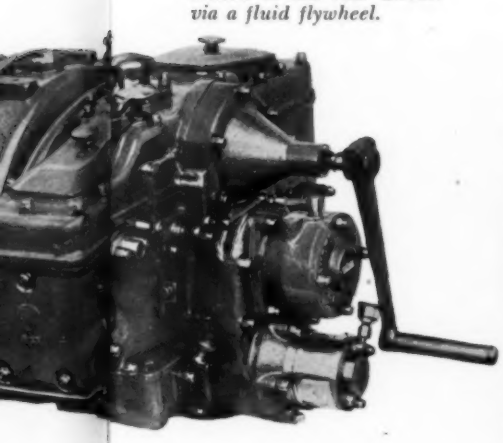
In use this engine has proved remarkably efficient and reliable, whilst German operators have nothing but praise for the method of

. . . . *And now please turn to page 40*

The sensational Gardner 4-cylinder 3.8-litre automotive Diesel. It develops 83 bhp. at 3,000 rpm. On a severe test run it demonstrated a fuel economy as high as 42 miles per gallon!



Left — The motor of this British bus, a 6-cylinder A.E.C. Ricardo Diesel of 115 bhp., is located on the extreme outside of the chassis. Power is transmitted to the rear wheels via a fluid flywheel.



DIESELS TO THE NORTH!

FEW people appreciate the safety and dependability of Diesel engines for long extended cruising purposes better than the veteran explorer or navigator who has spent years in Arctic waters. Any man who has made nine voyages to the Far North, covering a total distance of more than 50,000 miles in one ship powered with the same engine, may be considered an authority when it comes to judging the merits of various types of marine power plants.

Such a man is Commander Donald MacMillan, owner of the Schooner *Bowdoin*. He has sailed the treacherous Arctic waters in steam as well as Diesel ships. His ship hardly needs any introduction to the readers of DIESEL PROGRESS. Her deeds are history.

Commander MacMillan is now organizing another expedition and next June the *Bowdoin* will fit out and leave Wiscasset on her tenth trip to the Arctic, bound for Greenland and Baffin Land. Her four-cylinder, 60-hp. Fairbanks-Morse Diesel engine, installed in 1923, will again speed her on her way.

"The Diesel is *the engine* for northern work," says Commander MacMillan. "We installed the Diesel principally for this reason—to lessen the danger of fire. To lose ship and home and all means of subsistence at 50 and 60 below zero might easily be a very serious matter. Nearly every Arctic ship has been afire. Several have entailed loss of life.

"Packed and ofttimes buried in snow, as we are when wintering in the Far North, gasoline fumes have very little chance of escaping. With crew and Eskimos all smoking every day below decks, one might expect an explosion at any minute. Therefore, the installation of a Diesel engine and the consequent elimination of fire hazards was essential. We feel safe in the *Bowdoin* when she is 'nipped,' knowing that if rivets start in our bilge tanks, holding 2,200 gallons of fuel oil, it won't be gasoline running around beneath our feet."

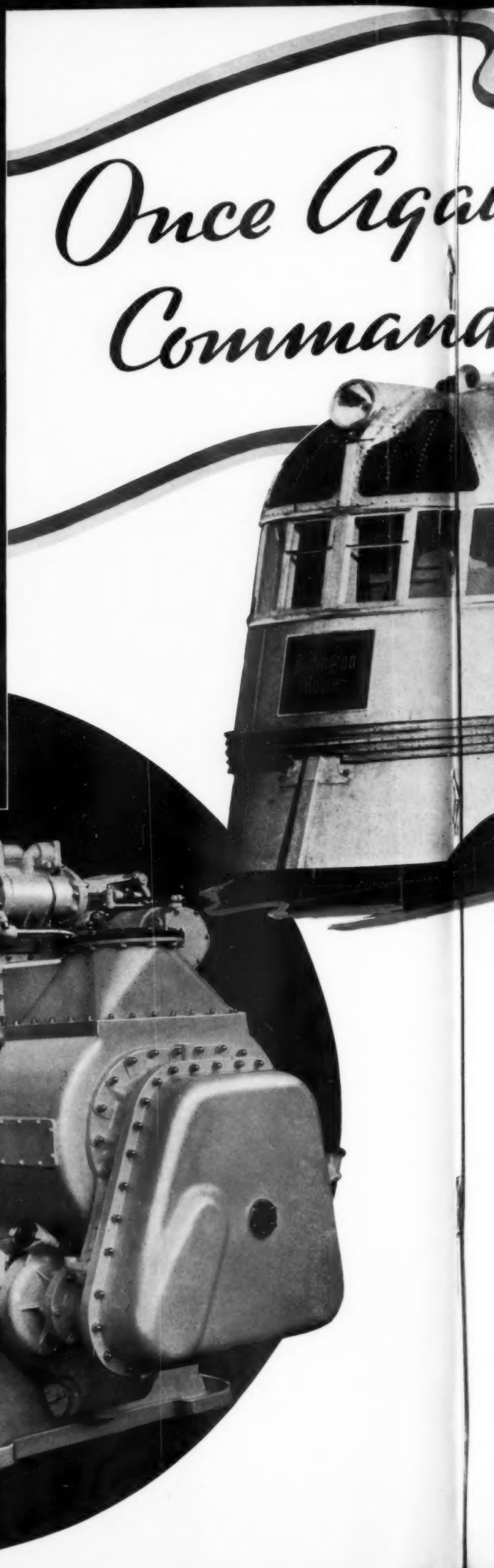
The *Bowdoin*, built by Hodgdon Bros., Boothbay, from designs by William H. Hand of New Bedford, is constructed of white native oak and is double timbered. She is specially designed to navigate in Arctic regions and is sheathed with ironwood. She is 88 feet long, 20 feet in beam and has a moulded depth of 10 feet. Her gross weight is 60 tons.

Her Diesel engine solved the problem of getting a ship of sufficient cruising radius to reach

. . . . *And now please turn to page 42*

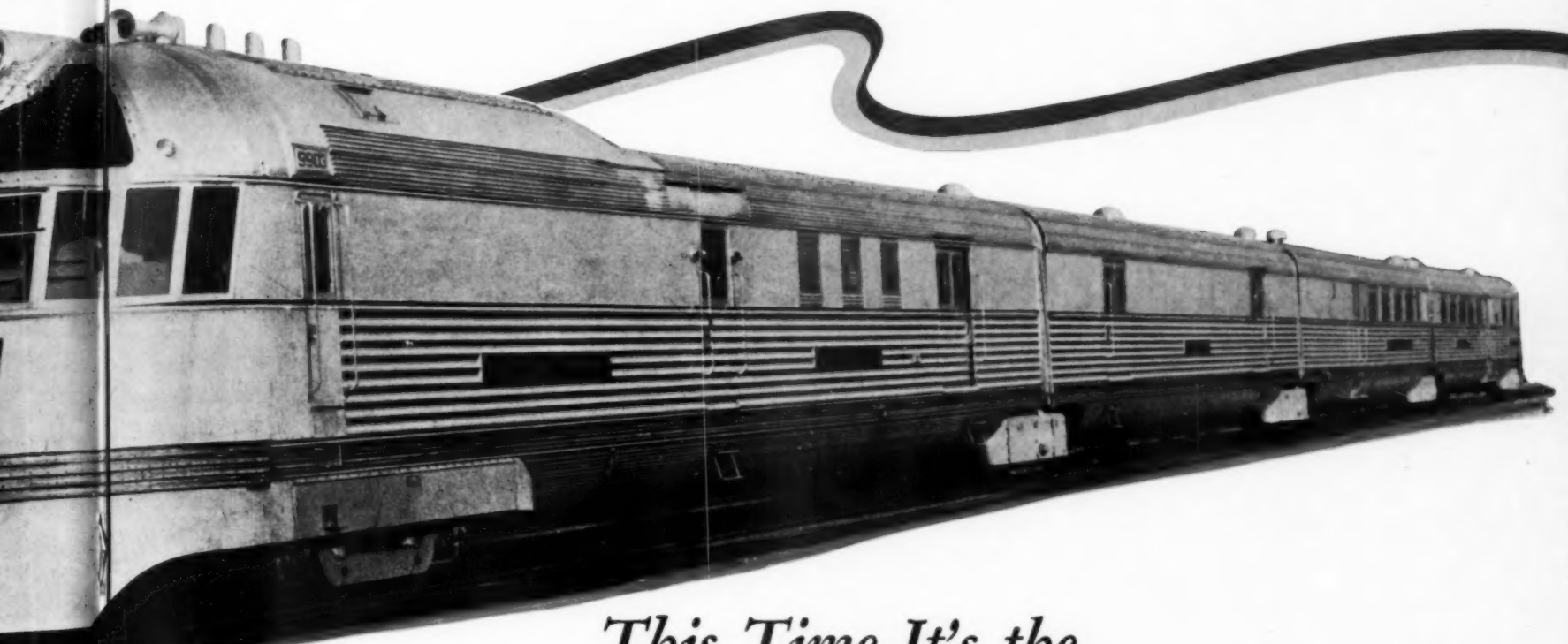
No, this is not the moon as it might look to a New Year's Eve celebrant, but a photo of the sun in its path at 78 degrees, 20 minutes, North latitude, taken at exposures 20 minutes apart. Left — The Schooner Bowdoin *"frozen in" for 320 days in North Greenland in 1923-1924. She has been within 679 miles of the North Pole.*

Commander Donald B. MacMillan at the helm of the Bowdoin.



Showing the eight-cylinder, two-cycle, 600 h.p. Winton-Diesel engine that powers the *Mark Twain*. The original *Burlington Zephyr*, operating between Omaha and Kansas City, and the *Twin Zephyrs* operating between Chicago and Twin Cities are also powered with similar engines

Again the Name "Mark Twain" Commands the Attention of America!



This Time It's the

WINTON-DIESEL-POWERED

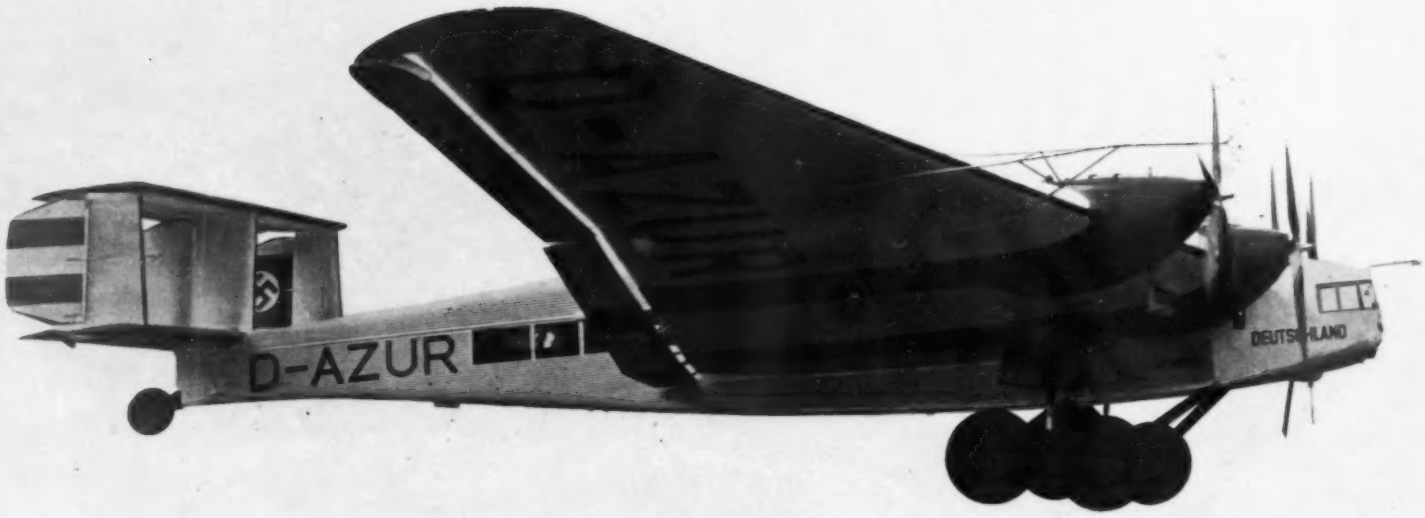
Mark Twain Zephyr

Halley's Comet flashed across the heavens in 1835. That year was born Samuel Clemens, known and cherished as Mark Twain, a name that will always shine with especial brilliance in the firmament of American authors. Halley's Comet next flashed into sight in 1910, the year Mark Twain died. Today, twenty-five years later, a new comet is associated with the name of Mark Twain . . this time a flashing comet of the rails that has already traveled at the phenomenal speed of 122 miles an hour. Commemorating the centennial anniversary of the famous humorist's birth, the Burlington Railroad has named their latest, high-speed, streamlined Zephyr train, the *Mark Twain*. This new Zephyr is a four-car unit consisting of locomotive, mail and baggage car and two modern streamlined passenger coaches. It is operating on regular schedule between St. Louis and Burlington, passing through Hannibal, Missouri, the boyhood home of Mark Twain. Fourth-in-line of the Zephyr trains, The *Mark Twain* continues to perpetuate a famous heritage in that it is powered with a 600 h. p. Winton-Diesel engine. Latest addition to the Burlington's family of famous trains, this *Mark Twain* Zephyr plays an important role in promoting the comfort, safety, and convenience of the traveling public. Winton-Diesel Engines again point the way to secure a return of the traveling public to the rails and increase revenues to a point commensurate with investment.

Symbol of Economy and Dependability

WINTON ENGINE CORPORATION

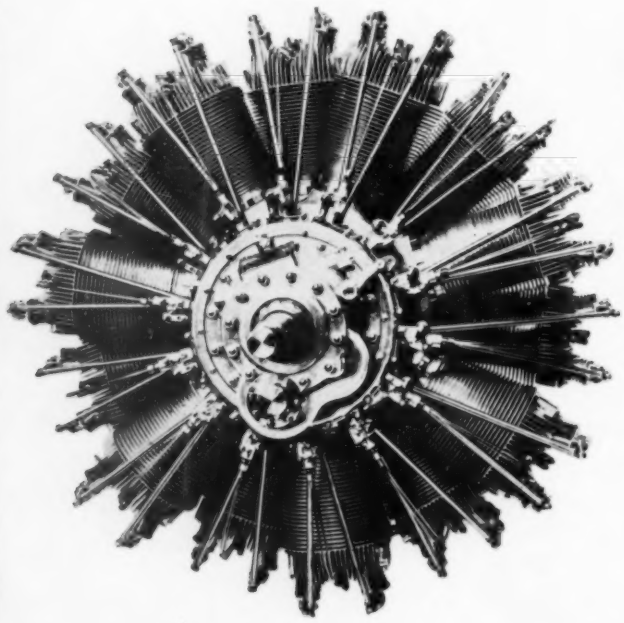
CLEVELAND, OHIO, U. S. A.



WHAT TYPE OF AIRCRAFT DIESEL?

By PAUL H. WILKINSON

Figure 1



NOW that the trans-oceanic airlines of the world are seriously considering equipping their airplanes with Diesel engines, the question naturally arises—"What type of engine will they use?" This will depend primarily upon the types of engines now available, and will also be governed by their relative frontal areas when installed in the wing of the airplane.

The Clerget 14 F-2, shown in Fig. 1, is a fourteen-cylinder, two-row radial, air-cooled engine, which is rated at 600 hp. and has a frontal area of 13.00 sq. ft., equivalent to 46.15 hp. per sq. ft. of frontal area.

The Mercedes-Benz OF-2, a twelve-cylinder, vee-type, liquid-cooled engine, shown in Fig. 2, has a rating of 720 hp. and a frontal area of 11.39 sq. ft., equivalent to 63.21 hp. per sq. ft. of frontal area.

The Napier "Culverin," a six (twelve)-cylinder, vertically opposed type, liquid-cooled engine, shown in Fig. 3, is rated at 720 hp. and has a frontal area of 10.70 sq. ft., which is equivalent to 67.29 hp. per sq. ft. of frontal area.

The Junkers "Jumo" 5, shown in Fig. 4, is a six (twelve)-cylinder, vertically opposed type, liquid-cooled engine, which is rated at 550 hp. and has a frontal area of 6.55 sq. ft., equivalent to 83.97 hp. per sq. ft. of frontal area.

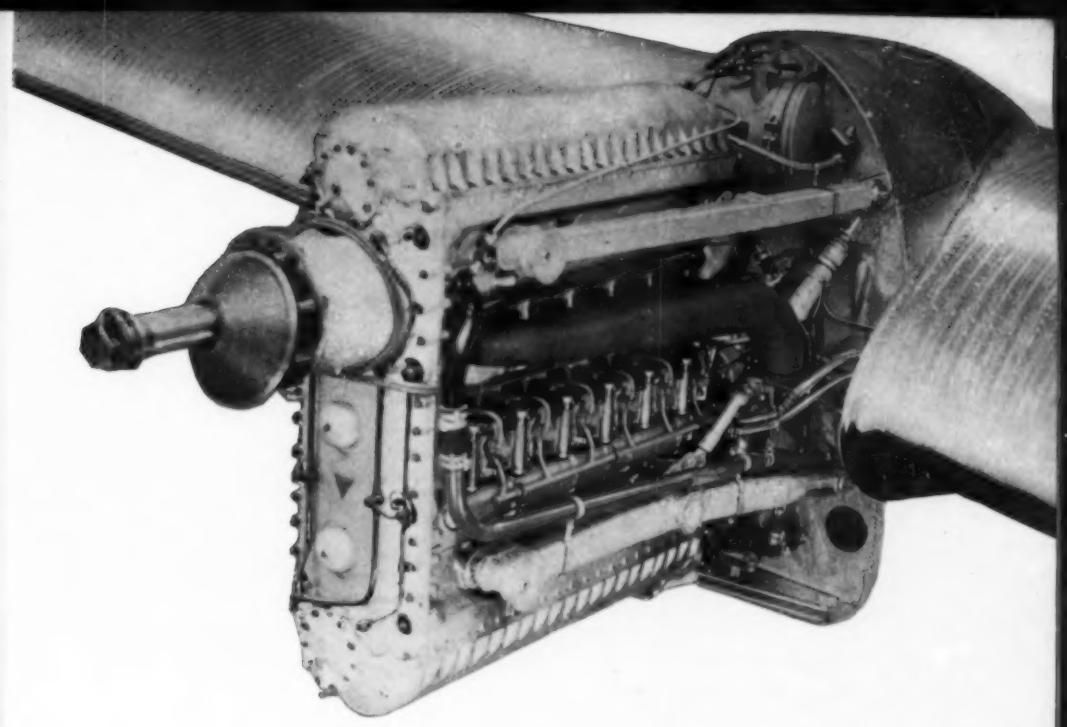


Figure 4

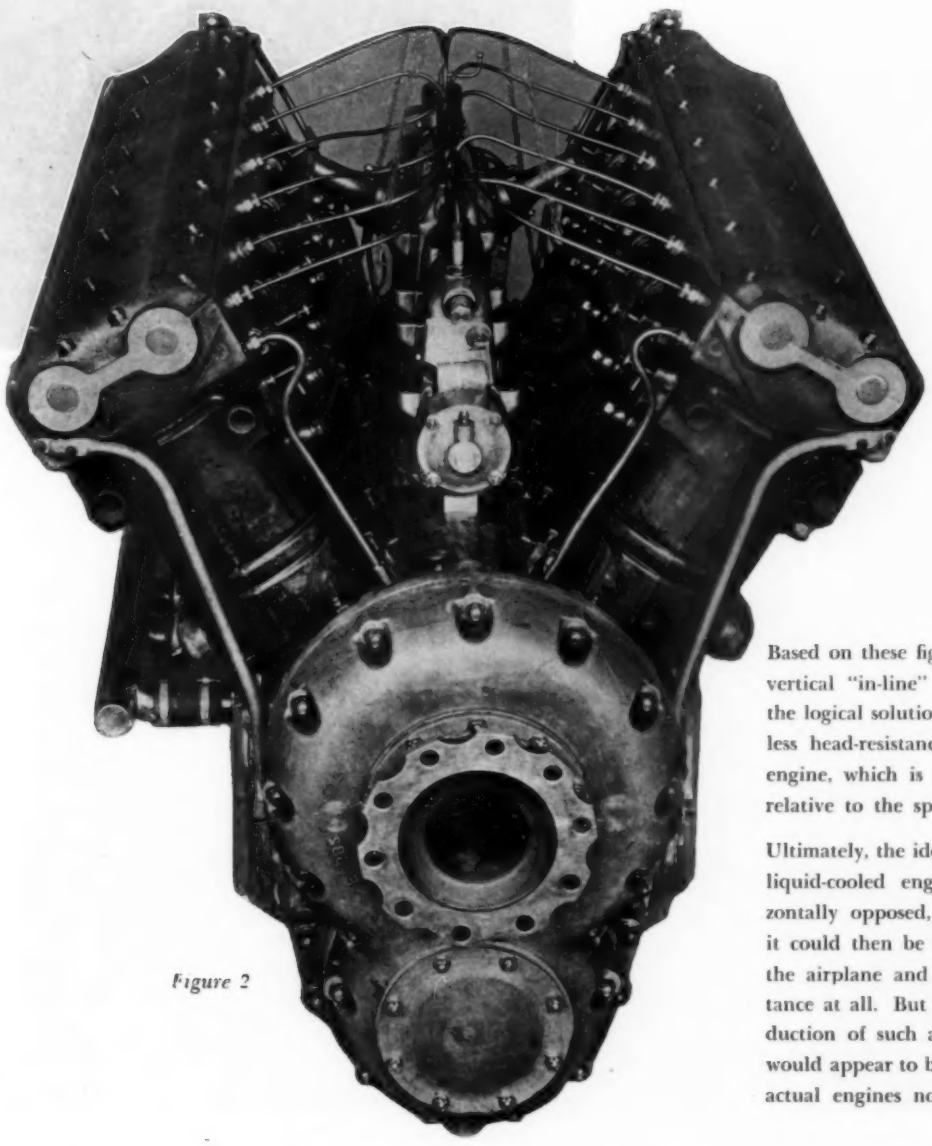


Figure 2

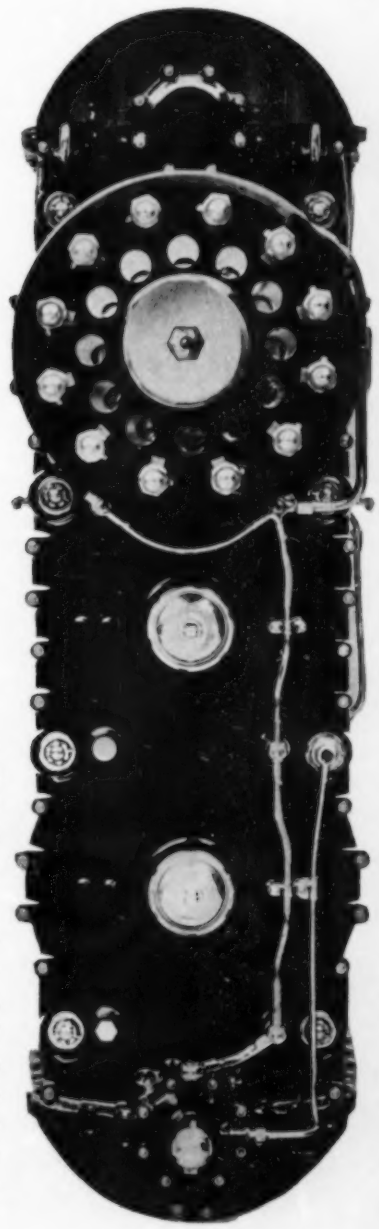


Figure 3

Based on these figures, it will be seen that the vertical "in-line" engine would appear to be the logical solution at present, as it offers much less head-resistance and drag than the radial engine, which is a factor of great importance relative to the speed of the airplane.

Ultimately, the ideal arrangement would be the liquid-cooled engine with its cylinders horizontally opposed, in "pancake" formation, as it could then be mounted within the wing of the airplane and would offer no frontal resistance at all. But pending the commercial production of such an engine, the "in-line" type would appear to be the most suitable, using the actual engines now available to the industry.

A NEW DRAGLINE DIESEL

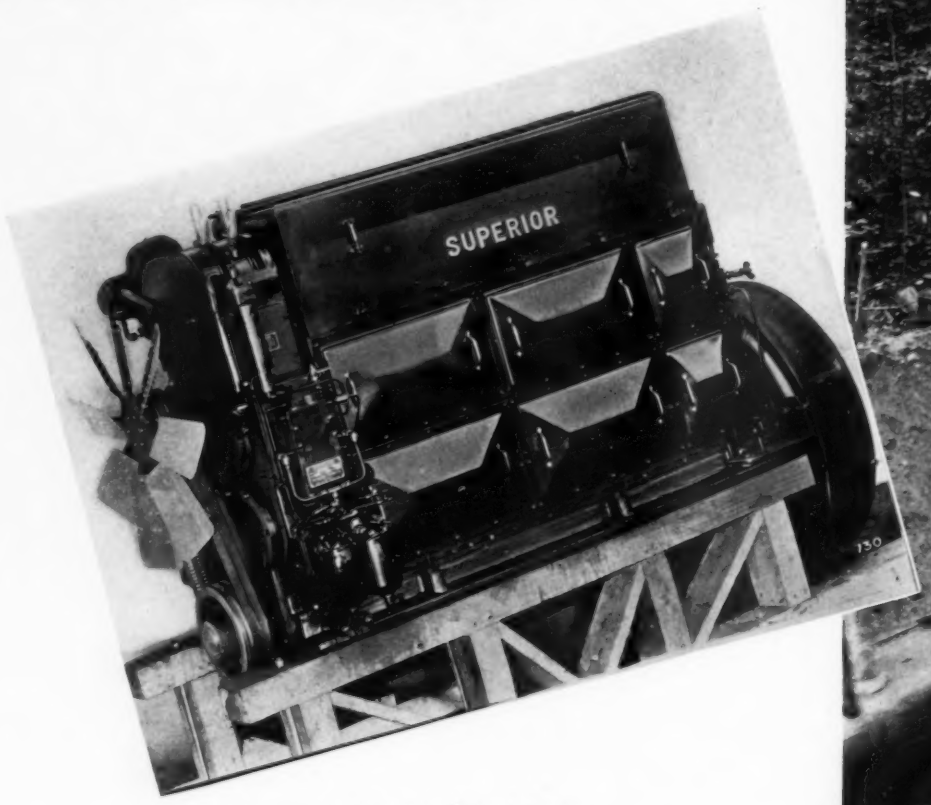
THE National Superior Company has successfully developed a series of medium speed, heavy duty Diesels for Dragline, Shovel and Locomotive service to meet the demand for an engine somewhat more powerful, somewhat more rugged than the so-called automotive Diesel used in the smaller capacity Shovels.

On this and the opposite page appear illustrations of Draglines powered with this new engine, a number of which are now in useful service, giving a good account of themselves.

The Superior Diesel used in both the Marion and Lima Shovels illustrated is a five cylinder, 7″ x 9″, with a piston displacement of 1,732 cu. ins. and a piston speed of 1,050 feet at 700 rpm. The rated horsepower is 140 hp. but can be safely operated at 155 hp. at 800 rpm. This same series of engines is built in six and eight cylinder units and there is a 9″ x 12″ Superior Diesel of this same type, built in five, six and eight cylinders, for larger shovels and locomotives.

The detail of equipment on these engines has been worked out to a fine point. It is possibly the only Dragline engine to be equipped with a permanently installed Alnor pyrometer – a very important piece of accessory equipment for the Shovel operator. Duplex Bosch filters on the fuel line and Cuno filters on the lube line. An instrument board which automatically supplies the operator with his lube oil pressure, starting air pressure and fuel injection pressure.

All in all, the ruggedness and dependability of the standard industrial Diesel engine has been carried into the design of this mobile Diesel and the successful manner in which it has met the rigorous services indicated by these illustrations, indicates that it will meet similar tough requirements in the industrial locomotive field.



Five cylinder, 7″ x 9″ Superior Diesel Engine developed for dragline and locomotive service.

Lima Shovel with two-yard dipper digging frozen shale on the Fort Peck Dam project in Northern Montana. Four Lima-Superior Shovels are being used on this ten million yard job, all owned by the Spillway Builders, Inc.

Type 371 Marion Dragline, 1¾ cu. yard capacity successfully powered with the new 7" x 9" Superior Diesel. Winston Bros. Co., Minneapolis, Minn., are using a type 381 Marion 2 yard Shovel with this same Diesel.

Another Marion Shovel of the type now successfully using the Superior Diesel—a 1¾" yard job. Down near Brazil, Ind., the Anka Company is using a type 38-A Marion, Superior equipped, in coal stripping service.

"Turecamo Girls," flagship of the Turecamo towboat fleet is powered with a 600 hp. Winton Diesel.

"WE'LL BE 100 PER CENT DIESEL YET"

Says THE B. TURECAMO CONTRACTING CO.

SUCCESS in business is won in many ways. Carnegie amassed a fortune because he was shrewd enough to hire the best men he could find and use their brains. Today the owner of a successful business cannot stop at man power. In this machine age he must have machinery that will multiply their efforts a thousandfold – and use it at a power cost low enough to meet competition far keener than in Carnegie's day.

Barney Turecamo of Brooklyn, started in the contracting business in 1908 with one horse and a wagon. Today his company, the B. Turecamo Contracting Company (whose Diesel driven paver, the first of its type ever built, was described in the August issue of DIESEL PROGRESS), employs more than 300 men and does over 75 per cent of all the new highway construction in Brooklyn and vicinity. Out of a total of 61 pieces of equipment, stationary, marine, and mobile units exclusive of trucks, nearly 2,000 horsepower, or approximately half of it is Diesel.

Turecamo's latest installation is a power plant consisting of two three-cylinder, four-cycle, 150 hp. Winton Diesels, each direct connected to 125 kva. Westinghouse alternators with V-belt drive exciters. Among the interesting details of the installation are Hydroil purifiers to safeguard the oil supply, and Coppus air filters to insure against silica dust, rather important since the air is heavily laden with floating dust particles. The engines are further protected with Alnor pyrometers.

This generating unit furnishes current to operate a large jaw crusher for breaking stone, a Bucyrus Erie crane for unloading stone barges, and an asphalt plant with motor-driven elevators, mixers and driers. Altogether the entire plant is operated with electric motors whose total load aggregates 780 horsepower, though all these motors are not in use at the same time.

Formerly the Turecamo plant paid the local power company about $1,000 a month for its electricity. Now its bill has shrunk to $8 a month, since current is purchased only for lighting purposes at present. With the new Winton generating plant, the Turecamo Company estimates its power cost has been reduced to considerably less than one cent a kilowatt.

In addition to this Diesel-driven plant and

The new power plant of the Turecamo company, comprising two 3-cylinder, 4-cycle, 150 hp. Winton Diesels direct connected to 125 kva. Westinghouse alternators. Coppus air filters are located at the top of the two air intake manifolds shown leading to the roof.
Below — An aerial view of the Turecamo dock and buildings, foot of 24th Avenue, Brooklyn.

equipment, Turecamo has been operating a Diesel towboat since 1933, one of a fleet of three which are used not only for towing sand, stone and bulk materials, but for a general towboat service extending the length of the Atlantic coast. A fourth, now under construction will be also Diesel driven. It will be steel, 99 ft., 8 in. long with 23½ ft. beam and 11 ft., 4½ in. depth. A 600 hp. Winton Diesel has just been shipped by the Winton Engine Corporation to East Boothbay, Me., where it is being built. Delivery is scheduled for March, 1936. The Diesel powered units used by the Turecamo Contracting Company in road building comprise two 75 hp. Caterpillar graders, a 120 hp. Caterpillar bulldozer, a Ransome dual drum paver powered with a 106 hp. Buda Diesel and an air compressor to supply drills and jackhammers, operated by a 10 hp. Winton Diesel.

Barney Turecamo declares that Diesel units have shown such economy of operation in comparison with gasoline units that hereafter, all units purchased must be Diesels. This ultimatum goes for the 25 trucks owned by the Turecamo Company as well.

"No more gasoline powered trucks after now," says Turecamo. "Our next trucks will be Diesels."

Barney Turecamo is Diesel-minded. Diesels showed him the way to new profits in the years when the only way to make profits was to cut down on power costs. "We'll be 100 per cent Diesel yet," declares Turecamo.

WHERE DIESELS RULE SUPREME

THE Kaiser Paving Company's aggregate plant at Pleasanton, California, is considered by many to be the most modern of its kind in the United States, and undoubtedly in the world. It turns out sand and fourteen standard sizes of gravel and has a capacity production of 900 tons an hour. Diesels do all the work. Four Atlas Imperial Diesel engines are employed.

Built in 1930 under the supervision of the former superintendent, T. M. Price, who built the Boulder Dam concrete plant, it is the last word in mechanization and efficiency. Perhaps this will explain why it has been operating continuously ever since when throughout the country hundreds of such plants were idle during the lean years of private construction in the interim.

Superintendent D. A. Rhodes describes here in his own words, the economies of operation made possible by Diesel machinery:

"Mr. H. J. Kaiser, who heads our company, has long been very much Diesel-minded. We put in the first two Diesel dinkey locomotives ever built. These were two Atlas Diesel powered Plymouth locomotives and they have made history in the eight years we have had them. They were bought in 1927 and saw three years' work before being sent over to this new plant. This pair replaced a 30-ton gasoline-powered dinkey, although each of the Diesel locomotives is but 10-ton size. They cut our fuel cost 80 per cent and gave us much greater flexibility. The oil consumption and cost was about a toss-up between the big gasoline outfit and the two small Diesel dinkeys.

"In the pit we figure we save 75 per cent by the use of an Atlas Diesel powered Monarch 75 tractor, which has been performing like a Trojan for a good many years. Mr. Kaiser began using Diesel tractors long before the tractor manufacturers were able to supply them, and since he had plenty of experience with Atlas Diesels in other applications, he put an Atlas 80 into the Monarch 75 and it has been giving excellent service.

"The Atlas Diesel powered Brownhoist, which is used to load and unload railroad cars, and shuffle empties around the yard, was new when the plant started up in 1930, and it has worked all of the time since. As for the Plymouth locomotives that haul the cars of aggregate from the plant to the yard for unloading by the Brownhoist, in five years' time we have ground the valves twice and have had only one set of new pistons and cylinder liners, which is mighty good service considering it has operated in excess of 7,500 hours."

Where the first Diesel tractor was placed in service — the Kaiser gravel pit.

One of the pair of Atlas Diesel powered Plymouth locomotives owned by the Kaiser Paving Company used in shuttling freight cars to and from the gravel plant and the unloading yard. Above is shown one of the Kaiser Diesel towboats, likewise Atlas powered, used in towing barges loaded with concrete for the piers of the San Francisco Bay bridge.

DIESELS CLEAR FLORIDA JUNGLE QUICKLY

Before and After. As a contrast to the jungles of uncleared parts of Terra Ceia Island, here is a cleared portion on which is situated the charming home of D. G. Haley of the Ruder-Haley Co.

THE quickest and most economical way to clear a piece of Florida land, so D. G. Haley and L. S. Ruder of the Ruder-Haley Company have discovered, is not to cut the trees down, saw them up, and haul them laboriously away, but simply to yank them out of the ground, roots and all, with Diesel tractors as shown in accompanying illustrations.

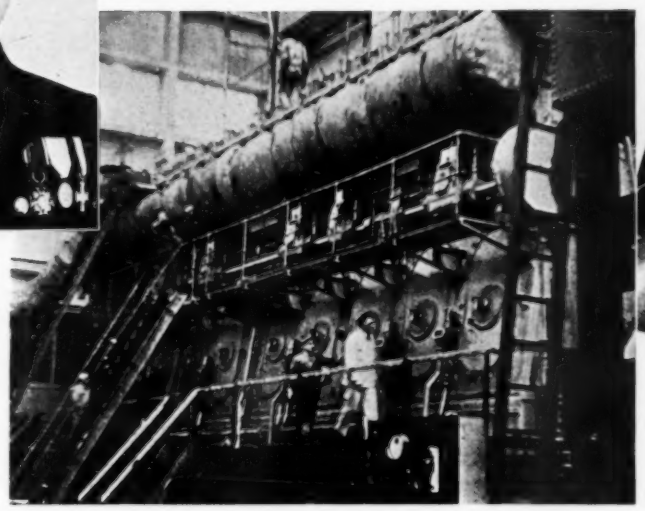
On a 450-acre tract of land on Terra Ceia Island, in Manatee County, just north of Bradenton, two Diesel-powered tractors have been busily at work for more than a year on a large-scale land-clearing operation. The timber on this tract is mostly oak and palmetto. To root out a tree, a heavy chain to which a wire cable is attached is looped around the base of the tree and the McCormick-Deering tractor on the other end of the cable does the rest. The island is only 1½ to 3 feet above sea level and is cut up by many bayous, around which the land is not suitable for cultivation. The trees, after they are removed, are dragged by the tractor to the edge of one of these bayous and left there.

After the trees are down and out of the way there remains a growth of scrub palmetto from

. . . . *And now please turn to page 42*

This veteran Diesel-powered tractor, pulling a brush-breaker plow, cuts the heavy roots of the scrub palmetto that remain after the trees are out of the way.

Here's a case where one pull wasn't enough. Sometimes it's necessary after pulling the tree over, to take another hitch with a chain and pull in the opposite direction to loosen the remaining roots.



Captain Mamert Stankiewicz, commander of the M/S "Pilsudski". (Right) Two views of the engines.

NEW MOTORLINER "PILSUDSKI"

BUILT to produce profits for her owners rather than to "out-super" other superliners in the European race for prestige, the *M/S Marshal Pilsudski,* flagship of the Gdynia-America fleet, sped into New York recently on her maiden voyage, establishing a new standard of Baltic-to-North America service by cutting down the traveling time from twelve to eight and one-half days.

Constructed in Trieste, Italy, for the Polish mercantile marine, now grown from one ship in 1925 to 86 today, she is the product of many nations, a large part of her navigating and galley equipment having been supplied in the United States. A sister ship, the *Batora,* also Diesel-propelled, is now nearing completion and will enter service next spring.

Having a gross register of 14,400 tons and a length of 514 feet, the *Pilsudski* was planned for a service speed of 18 knots, though in her trials she attained as high as 20.4 knots. Designed as a tourist ship with accommodations for 760 passengers, she has a 5,000-ton cargo capacity. Her crew numbers 257. Contrast this with the steam-driven, turbo-electric powered *Normandie,* carrying a crew of 1,300.

The *Pilsudski's* power plant consists of two nine-cylinder, single-acting, airless injection, Sulzer-type Diesel engines, each developing 6,250 bhp. at 130 rpm., and each directly driving one of the twin screws. On trials when a maximum speed of 20.4 knots was reached, their total output measured 14,000 shaft horsepower. Each engine is only 52½ feet long, 9¾ feet wide and 19¾ feet high. They weigh but 430 tons each and can be reversed in three seconds. Vibration is hardly discernible.

The Diesel exhaust gases, discharged into two composite waste heat boilers, supply all the hot water for the passenger accommodations as well as the steam for hot water and for heating. When the vessel is in port these boilers may be oil fired. An electric generating plant, consisting of four six-cylinder Sulzer Diesel-driven dynamos, running at 300 rpm., furnishes current for all power and lighting requirements at 230 volts. Two of these units drive compressors that supply the starting air. All the engines, including auxiliaries, are cooled by fresh water in closed circuits passing through coolers with sea-water circulation.

DIESELS CONQUER THE ANDES

By FRANK M. PRENDERGAST

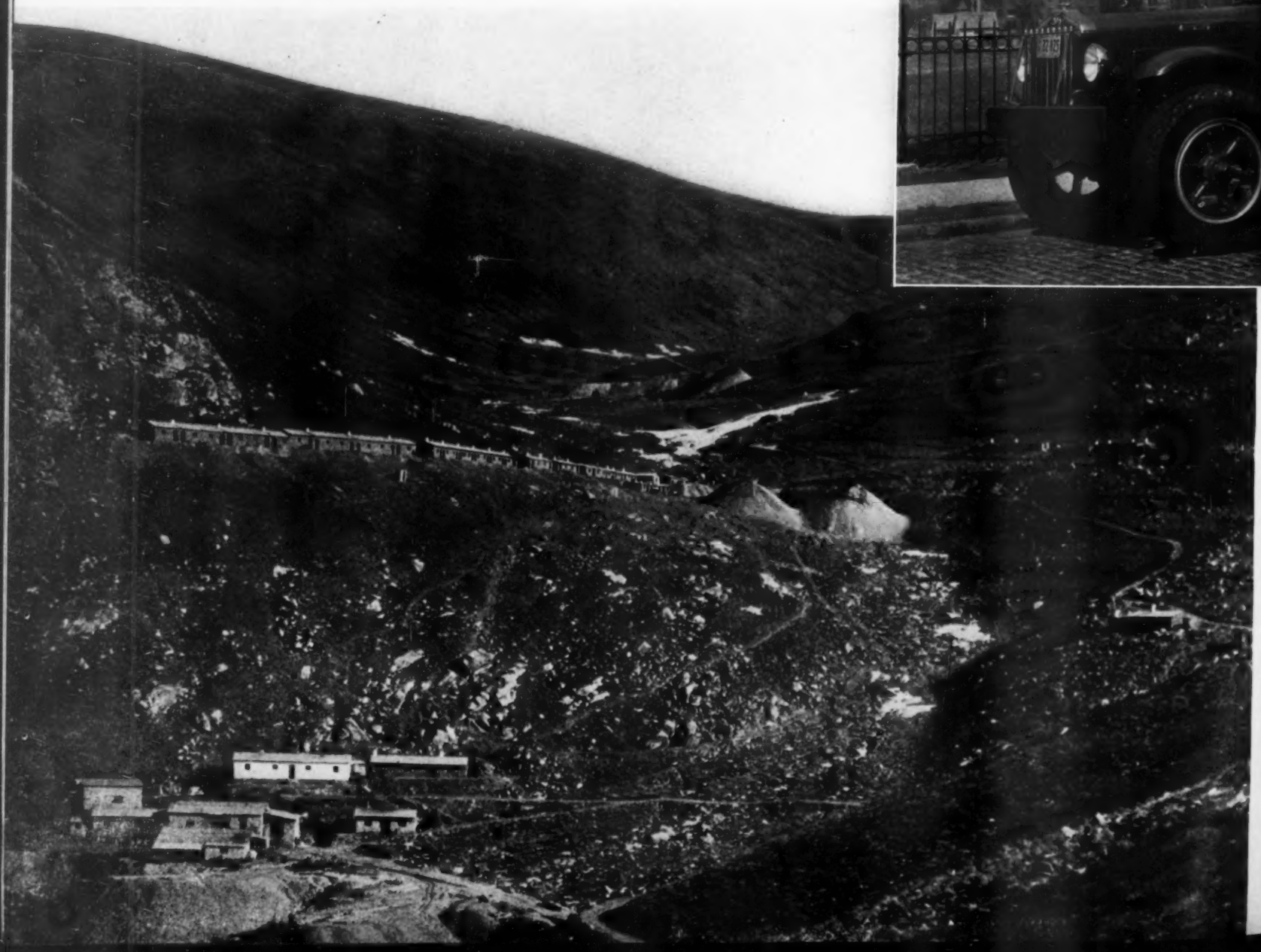
DON'T ever bet that any job is too tough for a Diesel. You may lose. Time and again during the last four years Diesel driven trucks have proved to the skeptics their astonishing ability to perform seemingly impossible tasks – not only perform them but do so within specified limits of operating costs, initial investment and speed requirements.

Here is the story of the year.

Far up in the Andes in the extreme northern part of the province of Jujuy, Argentina, sixty miles from the Bolivian border, are the lead and zinc mines of the Cia Minera Aguilar, S.A., a company operated by one of the oldest mining organizations in the world. The task that confronted the operators was the problem of hauling lead and zinc concentrates from the milling plant to the nearest shipping point, Tres Cruces, 35 miles distant, located on the nationally owned railway running between the port of Santa Fe, Argentina, and La Paz, the capital of Bolivia.

To span that distance by constructing a narrow gauge railway would have meant going to great expense considering the quantity of material to be hauled. The alternative was to truck it.

The 30-ton Sterling super-traction truck powered with a supercharged 125 hp., six-cylinder Cummins Diesel, the most powerful of its kind ever built. Below is a panorama view of the mines of the Cia Minera Aguilar, S.A., in Argentina.



That meant putting in a road. Next came the question as to whether any truck would be able to negotiate such a road as the mine company was prepared to build – of banked gravel and earth without macadam surfacing – and haul heavy loads over it all day long in that rarified air at an altitude of nearly two and a half miles above sea level, and with daily temperature ranges varying from ten degrees above zero to a maximum of ninety degrees. Even at sea level and in ordinary temperatures this would be a brutal task for any truck. There was no precedent to go by. Nothing like it had ever been done before. Obviously conditions under which the truck would have to operate could not in practice be duplicated for test purposes. Would a truck – any truck – perform under such difficult conditions?

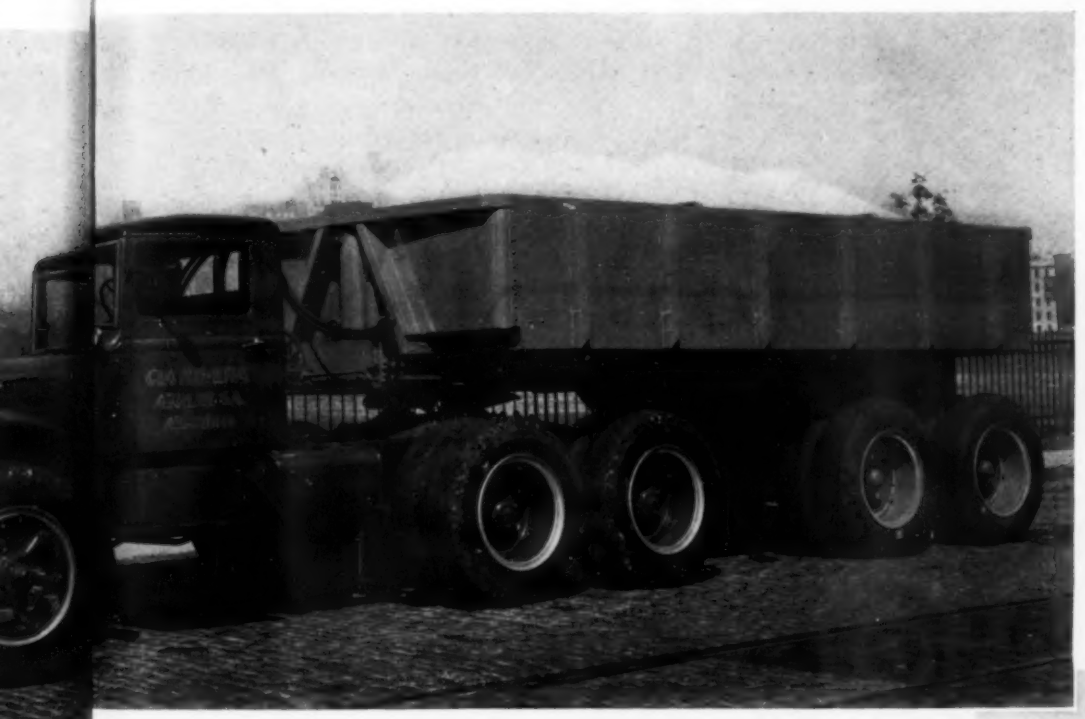
The mine operators put the problem up to several truck manufacturers. Some of them said it couldn't be done. Others doubted it very seriously but *thought* it might be done.

After considerable discussion with the mining company officials H. F. Staehling, vice president of the Sterling Motors Corporation of Long Island City, N. Y., submitted in conjunction with the engineering department of the Sterling Motor Truck organization at Milwaukee, some data concerning their Cummins Diesel powered model, HCS 210-H, equipped with a supercharger.

Such a truck would have the required engine power at an elevation of twelve to thirteen thousand feet where any ordinary, unsupercharged internal combustion engine would lose about 36 to 39 per cent of its rated horsepower. The net result was a 125 hp. supercharged Sterling Diesel truck with dual transmission built to carry a twelve-ton load "on its back" – rather than using a trailer unit. The axles of the four drive wheels were supported by equalizer springs so the chassis would remain level, even when all but one pair of wheels were tilted. The differential was so designed that it enabled all the power to be applied to the wheels in contact with the ground without any of them spinning. The truck was delivered last March.

It fulfilled every specification. Instead of carrying twelve tons for which it was designed, it demonstrated on a test run the first week in service, its ability to haul as much as eighteen tons up grades as well as on levels. So pleased were the owners that they ordered a second truck from the Sterling Motors Corporation that would be able to haul 30 tons!

The second truck was built and after being put through a series of careful tests, was shipped in October to Argentina. It is illustrated here. To get a better idea how its size and tractive power compare with the conventional type of heavy duty, tractor-trailer truck, note these facts:



The company's first Diesel truck, which demonstrated the feasibility of supercharged Diesels for high-altitude hauling. Left – Cutting a road for the truck out of the mountainside.

Length, overall	33 feet
Gross Weight, loaded	93,600 pounds
Number of Wheels	18
" " Speeds, forward	12
" " " reverse	3
Speed in Direct Drive	29 mph.
" " Over-Drive	38 mph.

The first truck is used as a rear-end dump truck with an underbody hoist while the second truck is used as a tractor in conjunction with a Freuhauf tandem axle, semi-trailer, on which is mounted a Gar Wood steel dump body with an inside length of 18 feet, 8½ feet in width, equipped with telescopic hydraulic hoists, one mounted on the forward end and one at the rear, with three gates dumping to the right. Both units are identical in design, except that one is used as a truck, transporting the load "on its back," while the other is used as a tractor.

Each of the eighteen wheels equipped with 10/50 x 24, pneumatic tires, are capable of bearing a load of 5,200 pounds. The main feature, however, is the Sterling Super Traction differential. At first impression it sounds complicated but it is not. It has three differentials, all of the Krohn high traction type. Here is what it does.

It stops wheel spinning and delivers the power to the wheel that has traction. It permits one or more wheels to turn faster than the other when rounding curves, but it does not allow one wheel to turn idly, thus robbing the others of power. On roads slippery with mud, snow, ice or loose gravel, there is no wheel spinning, with consequent loss of power, fuel wastage, or skidding. The wheels which have traction will move the truck.

The middle differential is the power divider. It equalizes or divides the power to the two sides of the truck. Immediately adjacent, on each side of the middle differential, or power divider, is a slightly smaller differential. The differential on the right divides or equalizes the power between the tubular jackshaft and the solid jackshaft on which the two sprockets on the right side of the truck are mounted. The differential on the left acts similarly for the jackshaft on the left side. It is for this reason that all chains tighten up before the truck moves when power is applied.

To explain further, tire diameters vary due to improper or unequal inflation, worn conditions and for other reasons. Tires of different diameters have different circumferences and therefore, the wheels on which they are assembled must turn at different speeds when traveling a given distance. Two differentials only, one in the forward axle and one in the rear axle, would not permit this. As a result, one or more tires, fully loaded, would be partially slid over the road bed with each revolution of the wheel. Terrific strains in the driving parts would follow. In other words, the axles would be "fighting each other." This is what the three-differential system prevents. Yet it is simple. Counting the housing and the different important parts assembled in it, the total is eight. Summed up briefly, it divides the power carried to it from the engine shaft evenly under all conditions. It compensates for varying tire diameters and for different chain lengths as well as for different wheel speeds when one or more wheels are on level ground while the others are inclined. It permits the outside wheels to turn faster than the inside wheels going around a curve, and it delivers the power to the wheels which have traction. Actually this gives "knee-action" flexibility and "free-wheeling" to each driving wheel of the tractor unit.

As the atmospheric pressure decreases with increasing altitude, larger volumes of air must must be delivered to the engine because its output is dependent upon the air weight charge. The powerful Cummins six cylinder 125 hp. Diesel engine is equipped with a Schwitzer-Cummins supercharger of the positive displacement type. The size and speed ratio of this unit are so chosen that it will maintain sea level atmospheres in the intake manifold when the truck is operating at 13,000 ft. elevation. Thus, it is possible to keep the engine output the same as at sea level. An automatic by-pass arrangement from delivery to suction side of the blower is provided to regulate the air volume at intermediate elevations. The efficiency lost due to this by-passing is very small.

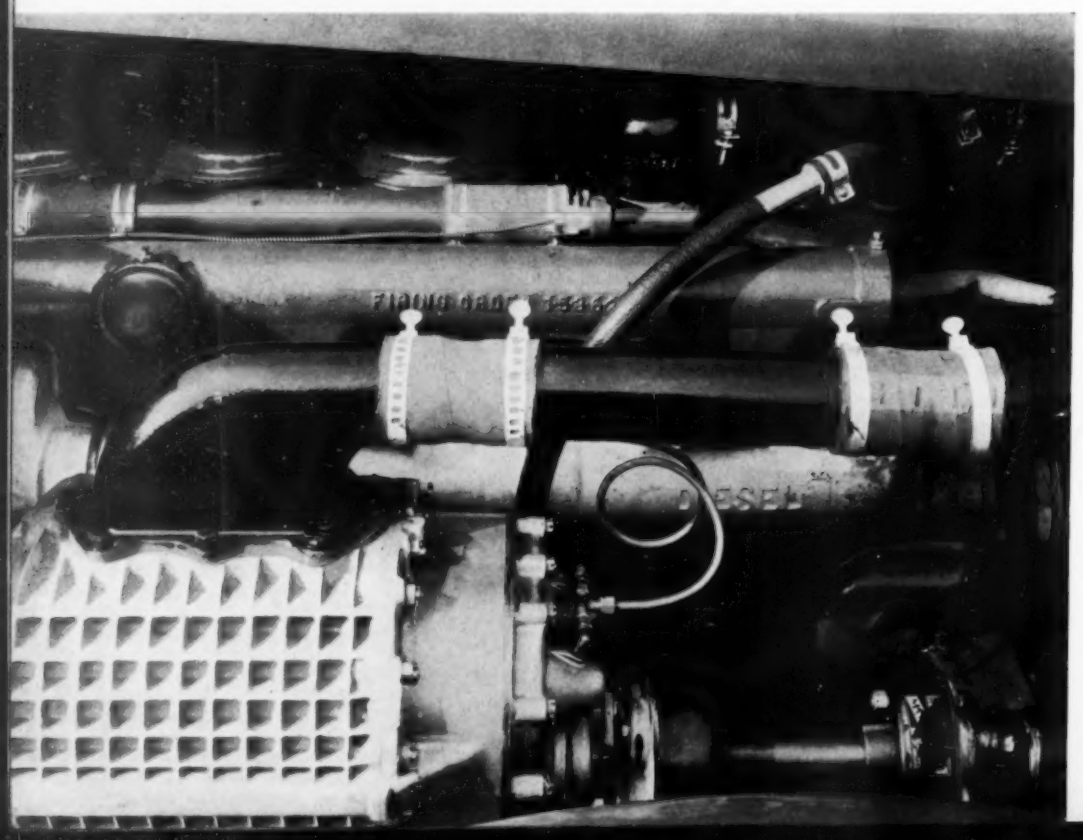
The use of superchargers to compensate for loss of power in high altitudes is splendidly evidenced by the successful application on these trucks. It is only a short time before supercharging will be used on standard installations to make possible the use of smaller engines and thereby decrease first cost and operating costs.

The motor drives the truck through a four-speed main transmission and a three-speed auxiliary transmission in connection with the above described three-way differential.

The mining company had already had experience with Diesels at its mines where Diesel-driven air compressors have been giving most satisfactory service. At this writing the Cia Minera Aguilar is installing a new Diesel power plant which will consist of three 390 hp. units furnishing a plentiful supply of alternating current for all its operations requiring electricity.

As this issue goes to press the Cia Minera Aguilar has just ordered a third Diesel truck, identical with second unit purchased – ample proof that Diesels were the right answer to the mining company's transportation problem.

Close up of the Supercharger mounted on the 125 hp. Cummins Diesel. The drive is taken from the crankshaft through two large V-belts. The unit is pressure lubricated from the engine.



FABRIFORM ELECTREFINER
A New Product

THE Fabriform Electrefiner re-refines used lubricants and as such fits well into the Diesel picture. For Diesel users spending $75.00 or more per month for lubricating oil this new unit offers an opportunity to save money.

The re-refining of crankcase drainings is no longer an experiment – it has been practiced for several years in many parts of the country and profitably so.

The Fabriform Electrefiner takes the used oil and by vaporization under automatically controlled temperatures, drives off the water, light oils, gases, diluents and other impurities which can be vaporized. Then the sediment and other material impurities are absorbed by a special refiner's clay (similar to that used in refining new oil). At the end of the refining process, the oil is automatically forced through a filter bed and cooled. The oil which results is said to compare, in test and in service, with the original oil put into the engine.

It is claimed for this new unit that Diesel users can re-refine their lubricating oil at a cost not to exceed six cents per gallon and consequently makes it possible for the user to re-refine his oil oftener, thus improving lubrication and lowering maintenance expenses.

Construction of the unit is rugged and simple, operation foolproof and easy. No acids are used, the oil is agitated by steam automatically. There is nothing to wear out, no moving parts, filter element can be renewed in about a minute and at very small cost – altogether this unit appears to be a practical accessory for the Diesel engine user. It has been investigated by one of our staff engineers who reports that claims made for it were substantiated for him in actual test and by him in contact with actual users of the equipment.

ZEPHYRS BREEZE

FOUR Diesel high speed trains built by the Edward G. Budd Mfg. Co. for the Chicago, Quincy & Burlington Railroad and all powered with Winton Diesels, have covered 615,124 miles to November 30th, and the Yankee Flyer of the Boston & Maine, a similar unit, has run 156,000 – a total of 771,124 miles for these five trains without injury to a single passenger. Operating and maintenance costs show that these trains operate at approximately 40 per cent less than the steam trains they replaced – and in each case passenger traffic has materially increased.

JONES TACHOMETERS

The Standard Diesel Tachometer . . .

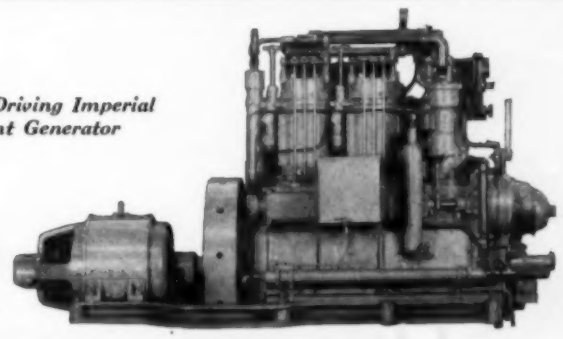
JONES Tachometers are regular equipment on Winton Marine Diesel Engines, and have been used on U. S. Navy Submarines since 1920.

U. S. S. Catchalot

JONES Tachometers can be furnished in various sizes ranging from 2¾" diameter to 10" diameter, either with or without revolution counters.

JONES-MOTROLA SALES COMPANY
370 GERARD AVENUE • NEW YORK, N. Y.

Winton Engine Driving Imperial Direct Current Generator



DURING THE PAST TWENTY YEARS . . .

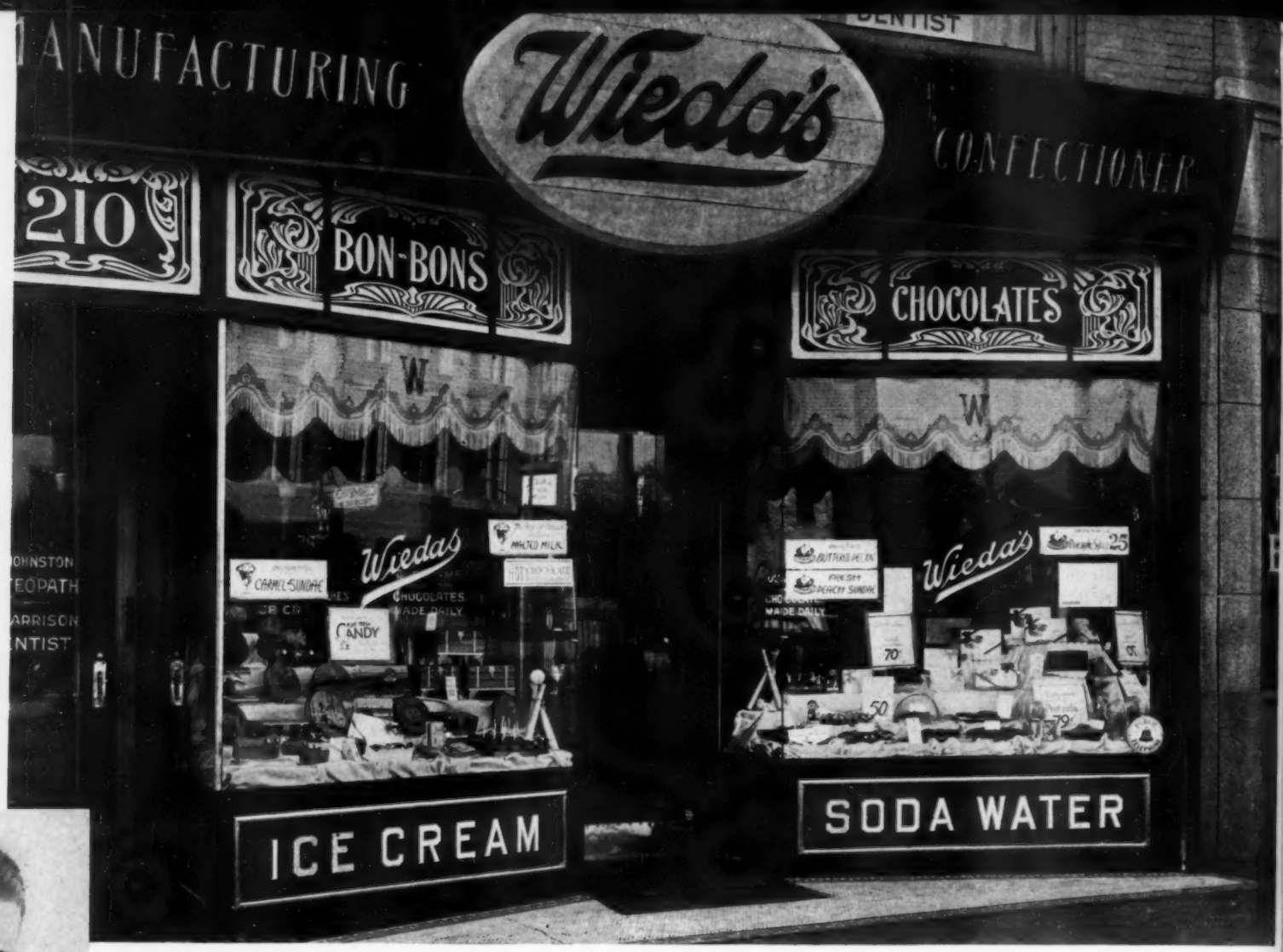
Hundreds of IMPERIAL GENERATORS Have Been Supplied for Gas and Diesel Engine Drives

WE BUILD
D-C Generators
A-C Generators
D-C Motors
Squirrel Cage Motors
Slip Ring Motors
Capacitor Motors
Motor Generator Sets
In sizes up to 75 kw. and 300 hp.

47 years' experience building quality electrical machinery, both standard and special, for any requirement plus an unusual degree of manufacturing flexibility makes Imperial an ideal source of supply.

WRITE FOR BULLETINS OR QUOTATIONS
THE IMPERIAL ELECTRIC COMPANY
60 IRA AVENUE, AKRON, OHIO

QUALITY SINCE 1889 RIGHT PRICES
Imperial
SERVICE COURTEOUS TREATMENT



E. G. Wieda

WIEDA'S, INC.

SWEET are the uses of adversity, wrote Shakespeare. When Wieda's candy store, Paterson, New Jersey, established in 1895, met adversity in the form of decreased revenue, as so many other retail businesses did during the depression days, the first thing its proprietor, Elmer G. Wieda, did was look around and see where he could lop off overhead.

As a user of purchased electricity he found for one thing that he was paying more for it per quantity used than he figured he should pay. Hearing from others about the economies of Diesels as a source of power, he began investigating and in February, 1934, bought and installed a 50 hp. Diesel electric generating set.

A check-up of his operating record recently disclosed the fact that it had operated up to September 30th of this year a total of 8,785½ hours, producing 169,550 kilowatts of electricity at an average operating cost of .814 cents per kilowatt hour, based on a consumption of 18,419 gallons of six-cent fuel and 552 gallons of lubricating oil at 50 cents a gallon.

The plant consists of a Buda six-cylinder 4" x 5½" Diesel engine, developing 50 hp. at 1,200 rpm., direct connected to a 37½ kva. G-E alternator. The jacket water is utilized as a source of hot water for cleaning purposes.

The power thus generated is used in the candy making department on the second floor of the building, where it operates several motor-driven machines such as mixers, moulding machines, cutters and blowers used on stoves, and in an

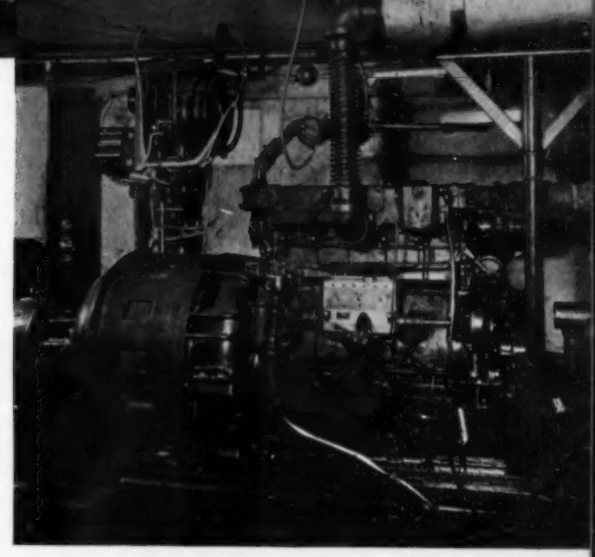
ice cream manufacturing plant in the basement, where it motivates a compressor unit, homogenizing equipment, pumps and ice cream freezers. It also furnishes current to light the store and manufacturing departments. However, the generating set produces a surplus of current, which Wieda disposes of profitably by selling it to the two adjoining stores in his block.

So far as Mr. Wieda knows, his is the first and only candy and ice cream store in the United States to install a Diesel generating plant. In comparing what it used to cost him for purchased current—approximately three and one-half cents a kilowatt hour, as against .814 cents a kilowatt hour for Diesel fuel and lubricating oil, he feels that the installation was well justified. The Wieda establishment employs eighteen people and the supervision of the Diesel generating set requires only about one-sixth of one man's time, a mechanic who services the candy and ice cream making machines.

Wieda's, Inc., not only reduced its overhead by installing a Diesel. It made itself independent of power company rate schedules and from the sale of its surplus current to neighboring stores increased its monthly income.

Here, summarized, are the actual operating figures and cost data since the Diesel plant was installed in February, 1934, up to October 1, 1935:

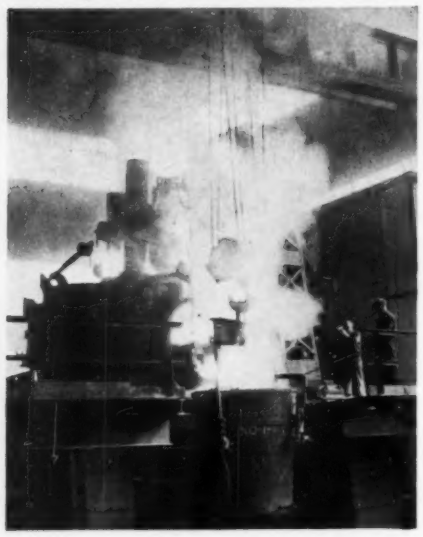
Hours operated	8,759
Kilowatts produced	169,550
Fuel consumed (@ 6c a gal.)	18,419
Lube oil (@ 50c a gal.)	552
COST per KWHR. with DIESEL	.814c
Former average cost of purchased electricity (per kwhr.)	3½c
SAVING	2.686c. per KWHR.



The Buda six-cylinder 4" x 5½" Diesel generator set used by Wieda, Inc., to operate its ice cream and candy making machinery.

National Forge and Ordnance Company

Irvine, Warren County, Penna.



All National Forge and Ordnance Company products are manufactured from fine quality Basic Electric Steel.

Complete control of all processing from selection of the melting charge to the finished condition is National Forge and Ordnance Company's guarantee for maintenance of quality in crankshafts and various other types of forgings furnished to leading manufacturers in the Diesel industry.

BASIC ELECTRIC STEEL FORGINGS

Carbon, Alloy, Corrosion Resistant and Special Steels Smooth Forged, Hollow Bored, Rough or Finish Machined, Heat Treated to Specifications. . . Forging Quality Ingots, Pressed or Hammered Billets.

DIESEL

MECHANICS and TECHNICIANS

The most exclusive Diesel Training School on Atlantic Coast. Combination Home Study, including six weeks' practical shop work.

Information and Circular on request.

NEW YORK DIESEL INSTITUTION
Incorporated
737 BROADWAY ALBANY, N. Y.

Attention—Men

IF you have a fair education, are mechanically inclined and sincerely believe in the future of Diesel Engines, we offer you practical home study training in your spare time. Small fee includes 2 years Consultation and Employment service, also tools. Write for full details regarding our plan of individualized training.

DR. O. F. SCHOECK SCHOOL OF DIESEL ENGINEERING
ALTON, ILLINOIS

Employers — We can furnish trained men in your vicinity.

LONDON LETTER

. . . . *Continued from page 19* . . . .

cooling. The air is circulated by means of a crankshaft-driven, centrifugal blower and a comprehensive system of encasement which directs the air stream to all important points. Four and a quarter cubic feet of air are thus forced by the blower around the crankcase, up the cylinder barrels and out past the cylinder heads in the course of a second.

Turning once more to developments in the British transport world, the recent exploits of the Q-type A.E.C. oil-engined coaches are worth mentioning. These machines are by no means new, but only recently have operators come to realize the advantages of increased seating capacity and greater engine accessibility offered by the design. During the last 6 months the A.E.C. works have been building Q-type chassis as fast as they can to keep up with the demands and on all sides tales of record high-speed engine changes and record low-priced maintenance bills are being told.

At first sight a system which locates the power unit on the extreme outside of the chassis, with the whole transmission line also outside, seems to defy all the established principles of chassis design. That it does so A.E.C. engineers are themselves prepared to admit, but what no one can dispute is the fact that the layout has shown itself sound and reliable in service. The proof of the pudding is always in the eating. Just so with the Q-type A.E.C.

The engine fitted in this chassis is the 6-cylinder A.E.C. Ricardo of 105 mm. bore by 146 mm. stroke, developing 115 bhp. at 2,400 rpm. A peculiar feature of the engine is the staggering of the cylinder block by means of an inclined crankcase face. The power is transmitted to the rear wheels via a fluid flywheel and epicyclic gear box, final drive being by underslung worm gear.

On the long distance journeys for which Q-type coaches are mostly used they are maintaining regular averages of 30 mph., and were it not for the British traffic regulations much higher schedules could be held. At 45 to 50 mph. riding in one of these coaches is as pleasant as in the average private car. All fumes are isolated from the interior and visibility is perfect for driver and passengers alike.

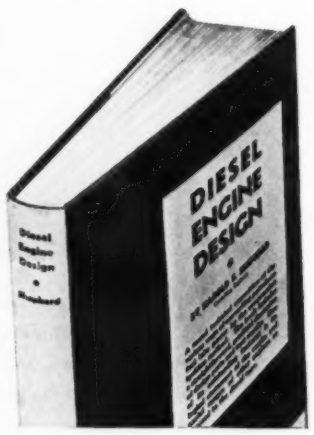


TABLE OF CONTENTS

Chapter I —Historical
Chapter II —Combustion
Chapter III —The Influence of the Combustion-Chamber Walls
Chapter IV —The Fuel Nozzle
Chapter V —The Fuel Pump
Chapter VI —Governing
Chapter VII —Cylinder Head, Valves and Valve Gear, Starting
Chapter VIII—Two-cycle Engines
Chapter IX —Injection of Gaseous Fuel
Chapter X —Bearings and Lubrication—Pistons and Piston Rings
Chapter XI —The Indicator Diagram
Chapter XII —The Inertia of Reciprocating Parts and Balancing
Chapter XIII—The Flywheel
Appendix

DIESEL ENGINE DESIGN

By HAROLD F. SHEPHERD

Consulting Engineer,
Member American Society of Mechanical Engineers

227 Pages, 6x9, $3.50

The only book in the English language which treats completely the design of all parts of the fuel injection apparatus and combustion chambers in Diesel engines—

"DIESEL ENGINE DESIGN" will be indispensable to the engineer who needs a sound technical exposition of the various ways of converting petroleum fuel into power by the compression ignition method. The author, H. F. Shepherd, is an authority on the design and operation of Diesel engines. He has for many years been active in their development, and is the inventor of numerous special features and improvements well known to engineers in this field.

Send Check or Money Order to

DIESEL ENGINES, Inc.
BOOK DEPT.
2 WEST 45th ST. NEW YORK, N. Y.

THE CANNON BALL

. . . . *Continued from page 17* . . . .

35 mph., making nineteen intermediate stops. The rail car is almost a duplicate of the one described in the August Issue of DIESEL PROGRESS, except that its power plant consists of two vertical, six-cylinder, four-cycle, 10″ x 12″ Ingersoll Rand Diesels, each developing 400 hp. for traction purposes at 700 rpm.

The power plant illustrated here is made up of a fabricated steel subbase upon which is securely bolted the aluminum housing and cylinders cast integrally. Cast iron cylinder liners form the inner surface of the water-jacketed cylinders. Aluminum cylinder heads of a new design make for turbulence of a rotary nature, and insure perfect combustion. High pressure fuel is delivered from an individual pump for each cylinder, to two diametrically opposed spray nozzles tilted down at an angle into the cylinder, a system of injection which has been developed by the Ingersoll Rand Company, and has been used with much success on the engines in over 110 locomotives and rail cars which are operating successfully and efficiently on many railroads and in numerous steel mills. The use of aluminum in the manufacture of these engines in this rail car makes for light weight construction, but retains the inherent advantages of a four-cycle engine.

Direct connected to each Diesel engine through a flexible coupling is a G-E direct-current generator. A G-E exciter of the split-pole type is driven from the main generator by means of "V" bolts. This machine furnishes power to excite the fields of the main generator and has characteristics that enable the main generator to utilize the capacity of the engine over the working range of locomotive speed. A 115-volt G-E auxiliary generator is mounted on the shaft of the main generator and serves to supply power for the auxiliary equipment and to charge the storage battery. The voltage of the auxiliary generator is held constant at all engine operating speeds by means of a voltage regulator, thereby providing a constant source of power for auxiliaries.

The current from the main generator is transmitted to General Electric direct-current series motors of the single-geared commutating pole type. Each motor is supported on its axle by brackets and bearings and on the truck transom by a spring nose support.

The speed of the locomotive is controlled from the operator's position by a manually operated throttle. The control is arranged for three motor circuit connections. In the first the motors are connected in series parallel, in the second, in parallel, and in the third, in shunt field. The transfer from series parallel to parallel to shunt field is effected automatically and is arranged to occur at the point which will result in the best utilization of the capacity of the engine.

Mounted on panels directly in front of the operator's seat are gauges showing lub oil pressure, temperatures, brake air pressure and other instruments so that the operator at all times has complete data on the performance of the rail car and its power plant.

The engine accessories include Nugent Oil Filters, Air-Maze Intake Air Filters and Burgess Exhaust Mufflers. A lubricating oil cooling section, consisting of a series of thin tubes, is provided, the fans circulating the air through both, the water and lubricating oil radiators.

The new Boston & Maine rail car has all the features necessary for improved service, namely — quick acceleration and get-away; economy in operation; low cost for repairs; less time out for repairs; cleanliness, and its inherent appeal to the American public — young and old.

Save Oil and Engine and Fire Hazard from a Hot Crank Pin With

NUGENT

FUEL AND LUBRICATING OIL FILTERS FOR DIESEL ENGINES

We make six larger sizes up to 8000 G.P.H. 15120 sq. in. filtering area per single unit. Space occupied only 7600 cubic inches.

Below is a proportionate illustration of five sizes with their respective cartridges.

FIG. 1116 NC #0 — FIG. NO. 1116 NC #1R — FIG. NO. 1116 HA #4R — FIG. NO. 1116 HA #4S — FIG. NO. 1116 HA # 4L

Filtering Cap. G.P.H. 5 to 150 Filtering Area 275 sq. in. Space occupied 272 cu. in. Price per sq. in. .081c.	Filtering Cap. G.P.H. 122 to 285 Filtering Area 513 sq. in. Space occupied 578 cu. in. Price per. sq. in. .0578c.	Filtering Cap. G.P.H. 442 to 960 Filtering Area 1,140 sq. in. Space occupied 930 cu. in. Price per sq. in. .0089c.	Filtering Cap. G P. H. 640 to 1,640 Filtering Area 2,280 sq. in. Space occupied 1,505 cu. in. Price per sq. in. .0456c.	Filtering Cap. G.P.H. 720 to 1,920 Filtering Area 3,780 sq. in. Space occupied 2,040 cu. in. Price per sq. in. .039c.

What does this GREAT filtering area mean to you? IT MEANS cleaner oil, fewer cleanings per year and very low up-keep. Compare the above filtering areas, the space occupied and price per sq. inch of filtering area with what you have, and expect to buy.

Cash in on Nugent's 38 years of Filter development and experience.

NUGENT TRADE MARK

Wm. W. Nugent & Co., Inc. Mfrs.

Oil Filters, Oiling and Filtering Systems, Telescopic Oilers, Oiling Devices, Sight Feed Valves, Flow Indicators, Compression Union Fittings, Oil Pumps, Etc.

415 N. Hermitage Ave. Established 1897 Chicago, U. S. A.

NUGENT TRADE MARK

GERMANY

German designers with thorough experience in design and construction of diesel and gasoline powered tractors and caterpillars will find immediate permanent employment in large well-known concern in Germany. Write Box 102, c/o DIESEL PROGRESS 2 West 45th Street New York, N. Y.

We Supply TRAINED DIESEL ENGINEERS

From New York, Chicago, Detroit Los Angeles, Seattle & Vancouver, B. C.

Former Diesel, steam and gas engineers, machinists, shovel and caterpillar operators, sales engineers. These properly trained Diesel men will make valuable Diesel operators, maintenance men and salesmen for you. Many firms look to us for their Diesel help. Write, wire or phone our nearest school.

HEMPHILL

PRACTICAL DIESEL SCHOOLS AND EMPLOYMENT SERVICE

NEW YORK: 31-28 Queens Blvd., L.I. City, N.Y.
LOS ANGELES: 2121 San Fernando Road
VANCOUVER, B. C.: 1365 Granville Street
DETROIT: 2340 West Lafayette Blvd.
SEATTLE: 503 Westlake Ave. N.
CHICAGO: 2020 Larrabee Street

DIESELS CLEAR FLORIDA JUNGLE

. . . . *Continued from page 32* . . . .

2 to 8 feet in height, which must be removed before the land can be prepared for planting. This job is also done by tractor, most of the work being accomplished with a wheel-type tractor pulling a big brush-breaker plow which cuts up the heavy palmetto roots and throws them up on the surface. The land is then gone over with a three-disk tractor plow and McCormick-Deering disk harrow. Since fertilizer is needed, one thousand pounds each of lime and hardwood ash is spread by a tractor-drawn lime sower over each acre. This work was done at the rate of about one acre a day.

Before the tractor-power method of clearing the land was adopted, it cost $80 to $100 an acre to clear the land and an additional $15 for plowing and harrowing. By the new method, a saving of approximately $75 an acre has been effected. The average cost of pulling the big trees with the Diesel tractor is about $10 an acre. Plowing and disking operations cost about $8.50 an acre, while the hand piling and burning of roots figures about $3.50 an acre. In its original state, of course, the land isn't worth much. However, when cleared, its value is around $800 to $1,000 an acre. While tomatoes are the major crop, returning about $2,000 to the acre annually, the land is well suited to cabbage, eggplant, squash, etc.

SPECIAL STEELS

MOST equipment manufacturers know exactly what they want in steels for bolting. As independent specialists in bolting, Erie can furnish Bolts, Nuts or Studs in any specified steel. . . . Write your specifications, gentlemen.

NEW YORK • PHILADELPHIA • CHICAGO

ERIE BOLT & NUT CO. ERIE PENNA.

DIESELS TO THE NORTH!

. . . . *Continued from page 20* . . . .

a high latitude and return to her home port without constantly replenishing fuel supplies. The *Bowdoin's* fuel consumption is five gallons of oil an hour, or 120 gallons a day. Her tank capacity of 2,200 gallons provides a cruising radius of 3,629 miles, which is remarkable, considering the size of the *Bowdoin*.

Commander MacMillan considers an experience that befell him and his men off the west coast of Baffin Island in August, 1929, the closest escape of their lives. The Diesel played an important part in it.

The *Bowdoin* was held fast in the ice. Suddenly in the dead of night, when no one was expecting it, a pressure ridge rose, squeezing the ship out of water on top of the ice pan, where she promptly fell over on her side. It was pitch dark and the wind was howling like a demon. The action took place so quickly that it was almost impossible to determine what had actually happened to the ship. Instantly sensing the danger, MacMillan ordered his crew out of their bunks onto the steeply sloped deck, where every man clung fast, awaiting what might come.

They had not waited long when the ice started to break up and carry the ship along in a swirling current. For about ten miles, as near as MacMillan could judge, the *Bowdoin* was carried along on the ice, with he and his men expecting that any moment other ice cakes would form a jam that would engulf the ship and swallow them up. Then the cake that held the *Bowdoin* fast, suddenly parted and down she slipped into water again — on an even keel.

A narrow lead opened up in front of them, barely discernible in the darkness. Then a huge iceberg swung in front of them and began to move out through the lead on the tidal current, clearing the pack ice ahead of it as the berg gathered speed in the wind. Ordering the engineer to start the engine he commanded the helmsman to make for the retreating berg and follow right behind. The command was executed and the berg cleared the way finally into open water, where the crew of the *Bowdoin* breathed safely again.

Had the engine failed to start this story might never have been told. Com. MacMillan believes that with the further development of small Diesel powered craft, such as ketches and auxiliary schooners, adapted to extended cruises, the future will see adventure-seeking yachtsmen exploring northern waters in greater numbers.

$2.00

MEMBERS

This splendid handbook is sponsored by the Diesel Engine Manufacturers Association consisting of the following members

BUSCH-SULZER DIESEL ENGINE CO.

CHICAGO PNEUMATIC TOOL COMPANY

CLARK BROS. COMPANY

COOPER-BESSEMER CORPORATION

DE LA VERGNE ENGINE COMPANY

ELECTRIC BOAT COMPANY

FAIRBANKS, MORSE & COMPANY

HILL DIESEL ENGINE COMPANY

HOOVEN, OWENS, RENTSCHLER CORP.

INGERSOLL-RAND COMPANY

MCINTOSH & SEYMOUR CORPORATION

NATIONAL-SUPERIOR COMPANY

NORDBERG MANUFACTURING COMPANY

SUN SHIPBUILDING & DRY DOCK CO.

WINTON ENGINE CORPORATION

WORTHINGTON PUMP & MACHINERY CORPORATION

FOR CONSULTING ENGINEERS AND DIESEL ENGINE USERS

D·E·M·A· *presents the new*

"STANDARD PRACTICES"

A Diesel Engineering Handbook written by Diesel Engineers for Diesel Engine Users

THE engineer especially and the Diesel user, also, cannot feel that he knows all about other phases of the Diesel industry unless the new issue of the D.E.M.A. "STANDARD PRACTICES" is also on his desk.

The DIESEL ENGINE MANUFACTURERS ASSOCIATION presents "STANDARD PRACTICES" to help users and consulting engineers to bring their Diesel background up to date, so that they will be able to deal with Diesel power as efficiently as they have dealt with steam and gasoline machinery in the past. It supersedes the 1930 "Standards of the Diesel Engine Manufacturers' Association" in more extensive form (see list of contents).

The rapid introduction of the Diesel to new industries and new applications, to people who have had little or no experience with Diesel power, has increased the need for clearer understanding of the true functions of buyer and seller. "STANDARD PRACTICES" explains clearly what the buyer should expect in terms of equipment and operating characteristics from the Diesel he buys or plans to buy.

"STANDARD PRACTICES" presents the standard practices of the industry, the economics of Diesel power, forms for bids and specifications, and a standard field test code, in addition to other valuable chapters. 180 pages, $2.00 per copy. Coupon at right for your convenience in ordering.

CONTENTS

Chapter I—Standard Performances, Equipment and Definitions.

Chapter II—The Cost of Diesel Power.

Chapter III—The Selection of Engine Sizes for a Given Load.

Chapter IV—Diesel Power-Plant Buildings.

Chapter V—Diesel-Engine Construction.

Chapter VI—Governors and Speed Regulation.

Chapter VII—Erection of Diesel Engines.

Chapter VIII—Fuel-Oil Storage and Handling Systems.

Chapter IX—Lubricating Oil Systems.

Chapter X—Cooling Water Systems.

Chapter XI—Intake and Exhaust Systems, Including Heat-Recovery Apparatus.

Chapter XII—Generators and Electrical Equipment.

Chapter XIII—Torsional Vibration and Critical Speeds.

Chapter XIV—Suggestions Covering the Preparation of Invitations for Bids and Detailed Specifications.

Chapter XV—Field-Test Code.

SIGN and mail the attached coupon, attaching remittance for two dollars for each copy desired. We extend you the privilege of returning this book to us, in good condition, within ten days of its receipt if it proves unsatisfactory to you. Copies of this book will be available on or about December 1, 1935.

DIESEL ENGINES, INC.
2 WEST 45TH STREET, NEW YORK, N. Y.

Enclosed find $2.00 for a copy of the D.E.M.A. Handbook entitled "STANDARD PRACTICES". To be mailed on or about December 1, 1935.

Name.....

Address.....

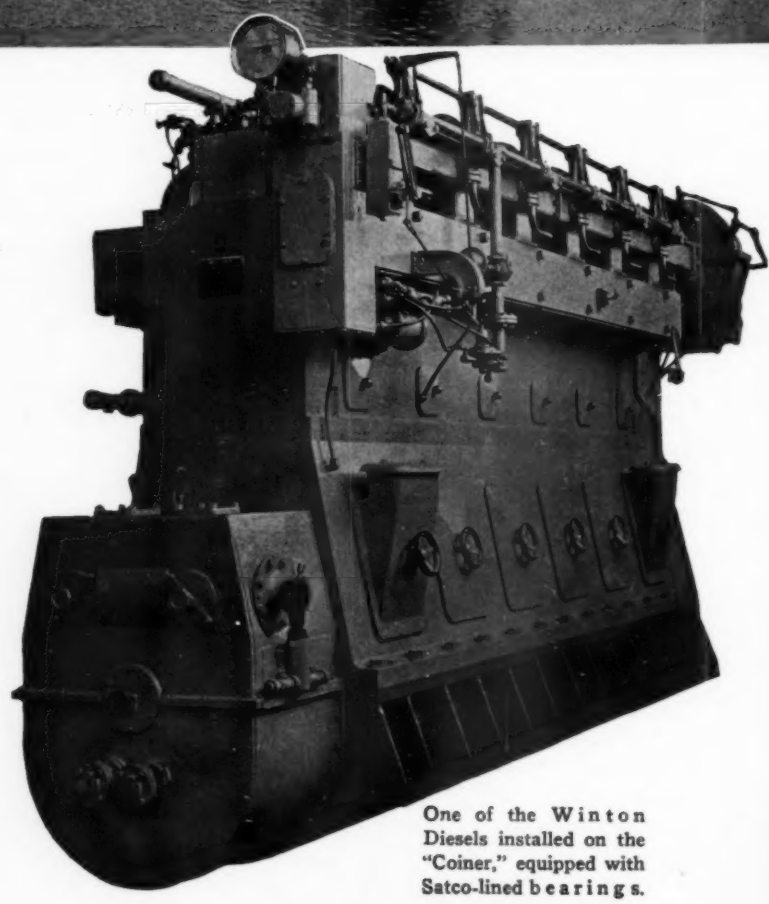
(Please print name and address)

SATCO* METAL BEARING

THE "COINER"—the U. S. Engineers' newest and largest towboat for Mississippi service—is powered with three Diesel engines . . . further proof of the fact that, afloat or ashore, for a heavy duty, economical power installation, modern engineering prefers a Diesel.

And to insure long, trouble-free service, manufacturers of Diesels prefer Satco-lined bearings. Perfect performance under severe service conditions has proved to them that Satco—the modern white metal alloy—has all the characteristics of the ideal bearing metal . . . a high melting point . . . a low frictional coefficient . . . hardness without brittleness . . . and the ability to conform to the ordinary play of a shaft.

The American Bearing Corporation designs and fabricates the several types of Satco-lined bearings required for Diesel engines. We will welcome an opportunity to tell you more about Satco and to help you solve your bearing problems.



One of the Winton Diesels installed on the "Coiner," equipped with Satco-lined bearings.

*A patented alloy manufactured by National Lead Company. Trademark registered.

AMERICAN BEARING CORPORATION

AFFILIATED WITH NATIONAL LEAD COMPANY

INDIANAPOLIS — CENTRIFUGAL FORCE — INDIANA

MODERN GOLD MINERS use ATLAS DIESELS!

WHAT the "Forty-Niners" used to do with pick, shovel, and gold pan, is now being done with Atlas Diesels, more thoroughly, more economically, and much faster than it was done by the old sourdoughs.

Out in the Mother Lode Country in California, Ferris and Cumle are working a marginal property by the new method of drag line dredging. They use an Atlas Diesel powered Bucyrus-Erie drag line to scoop up alluvial gravel from the stream bed and dump it into the hopper of an Atlas Diesel powered revolving screen built on a floating barge.

A third Diesel supplies the water for the pond in which the floating barge operates. The water is used to wash the gold from the gravel and mud dumped into the revolving screen, 600 gallons of water being required to wash a cubic yard of gravel.

With gold at $35 an ounce, miners can profitably operate many a marginal property with Diesel engines that could not be worked with gasoline engines or purchased electric power. Diesel economy spells the difference between profit and loss and if there is but a narrow margin to work on, economical power is paramount.

No matter whether you are working a placer, a dredge or a deep hole, there will be more profit at the end of the month if you do the job with Atlas Diesels. They are slow speed, heavy duty engines built for continuous service and they are available in a complete range of sizes. Complete details on any size unit are furnished on request.

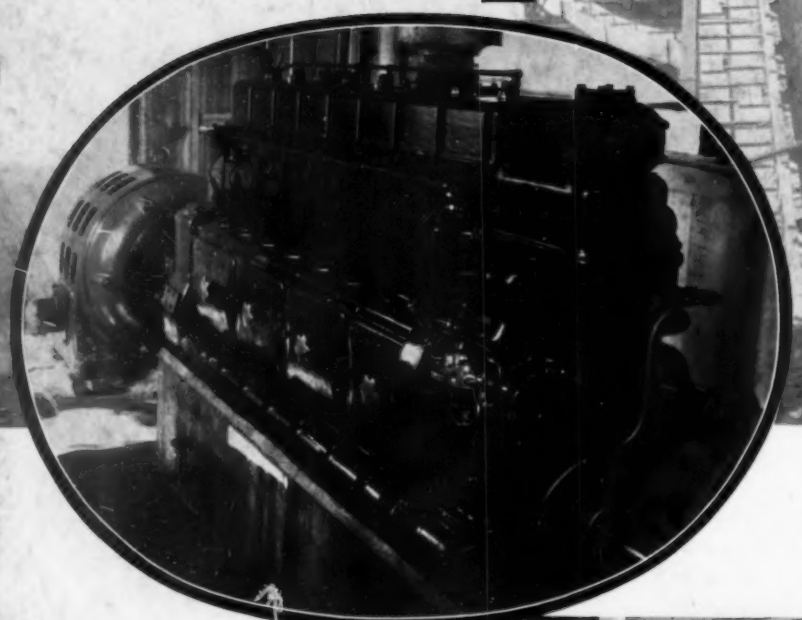
ATLAS IMPERIAL DIESEL ENGINE CO.

OAKLAND, CALIFORNIA • MATTOON, ILLINOIS

ATLAS IMPERIAL

HIGH POWER *Costs Took a Beating*

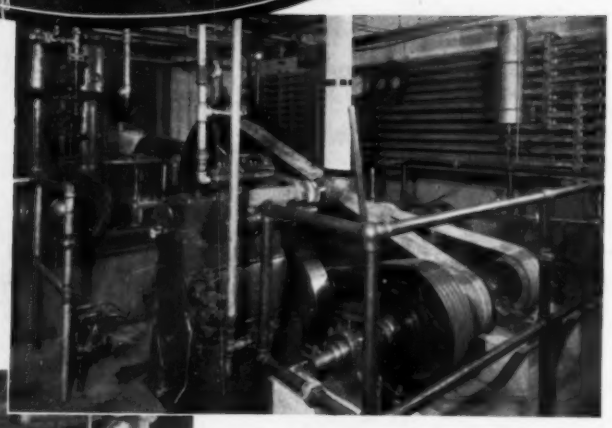
WHEN THESE F-M DIESELS WENT INTO SERVICE!



SAVES $241.14 PER MONTH

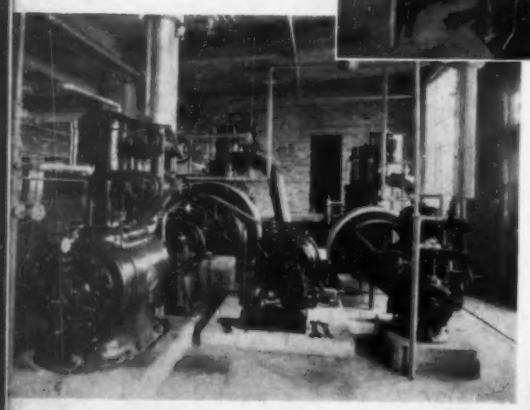
● **Purchased power for this job would have cost $297.90. An F-M Diesel generating unit did it for $56.75 — 19% of the previous cost!**

● **This is the F-M Model 36 8-cylinder 160 hp. generating unit on the job in the Southwest Sand & Gravel plant at Springfield, Missouri.**



● **DRIVES AMMONIA COMPRESSOR AT $47 MONTHLY SAVING**

The Joseph H. Story milk plant at New Haven, Connecticut, estimates that the first month's saving with F-M Diesels was $47 — a 53% saving over former costs.



● **ICE PLANT CHANGES TO DIESELS**

The Crystal Ice Company plant at Thibodaux, La., has just completed its second successful year with F-M Diesel power. Owner P. W. Chiasson is well pleased with the performance and economy of the F-M Diesels which drive the two Frick compressors.

A MILK plant in Connecticut complained about its bill for purchased power. An ice plant in Louisiana staggered under heavy demand charges imposed by the utility. A sand and gravel plant in Missouri balked at the cost of powering its grading machinery.

In these widely varying requirements, ranging from providing electric light to powering compressors and gravel plant equipment, F-M Diesels were chosen to replace purchased power . . . and their performance records have proved their value on the job.

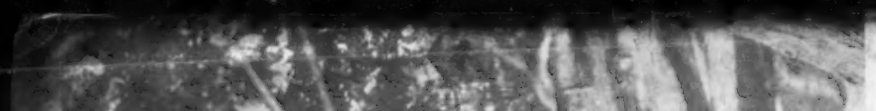
The first month's operating figures show savings of 53% for the milk plant and 81% for the sand and gravel plant — savings which will soon amortize the cost of equipment and turn in generous profits every month over previous costs.

No matter *what* your power requirements may be, there is an F-M Diesel in the type and size to handle them more efficiently, more dependably and more economically. Why not get full information today? Address Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 33 branches at your service throughout the United States.

6525—OA97.60

Pioneer Designers and Manufacturers of POWER, PUMPING AND WEIGHING EQUIPMENT 105 Years

FAIRBANKS-MORSE

DIESEL ENGINES

NEARLY THREE MILLION HORSEPOWER NOW IN SERVICE